Journal of the Royal Society of Arts

NO. 5048 JULY 1960 VOL. CVIII

ANNUAL GENERAL MEETING

The Council hereby gives notice that, in accordance with the Bye-laws, the 206th Annual General Meeting of the Society, for the purpose of receiving the Council's report and the Financial Statements for 1959, and for the election of officers, will be held on Wednesday, 29th June, at 3 p.m. at the Society's House.

(By Order of the Council)

KENNETH WILLIAM LUCKHURST,
Secretary.

THE SOCIETY'S CHRISTMAS CARD

The Christmas Card for 1960 will recall one of the most interesting of the Society's early efforts to promote the development of maritime transport. It will show a picture, specially painted by Miss Anna Zinkeisen, R.O.I., R.D.I., of members of the Society conducting the first of a series of trials of 'ship's blocks' (*i.e.*, scale models of ships) on Peerless Pond, near Old Street in the City of London, on 16th September, 1762. The 'blocks' (of 32-gun frigates and 74-gun ships) had been submitted in response to a prize offer made by the Society in 1758, and the purpose of these experiments, later completed on Snaresbrook Great Pond, Epping Forest, was 'to ascertain . . . the principles on which a good vessell is founded . . . passing through the water with least resistance seeming to be the first quality necessary'.

A reproduction of Miss Zinkeisen's painting and an order form for the card will be included in the *Journal* at a later date. The more distant overseas Fellows of the Society, however, may wish to save time by placing an order in writing now. If the name and address are required to be over-printed, the exact wording should be given.

COUNCIL DINNER

The Council of the Society gave a dinner party in the Council Chamber at the Society's House on the evening of 25th May. Mr. Oswald P. Milne, Chairman

of Council, presided, and Sir Duncan Oppenheim, Chairman of the Council of Industrial Design and of the Council of the Royal College of Art, was the guest of honour. Several Members of Council were present, and among the guests were representatives of firms who have generously supported the Society's annual Industrial Art Bursaries Competition. Several young industrial designers who have won bursaries in past competitions were also present.

After dinner, the company went to the adjoining exhibition rooms to see the exhibition of designs submitted in the 1959 Competition.

INDUSTRIAL ART BURSARIES EXHIBITION

As announced briefly in the last issue of the *Journal*, the Exhibition of winning and commended designs submitted in the 1959 Industrial Art Bursaries Competition was opened in the Society's exhibition rooms on 17th May by Mr. Whitney Straight, C.B.E., M.C., D.F.C., Deputy Chairman, Rolls Royce Ltd., and a Ministry of Education representative on the National Advisory Council on Art Education.

Welcoming Mr. Straight, Sir Ernest Goodale, C.B.E., M.C., Chairman of the Industrial Art Bursaries Board, said:

> I think it was in the 1920s that my father-in-law, the late Sir Frank Warner, then a Member of the Council of this Society, persuaded the Council to hold an annual competition of industrial design among students in the art colleges and schools of the country. These competitions were very successful, but they offered a large number of small prizes, and after Sir Frank's death in 1930 there was a gap and then the competition was revived in a different form. It offered a few relatively large awards to the most promising students who intended to make industrial design their career. After the Second World War the competition began again in this revised form, and in substantially the form that we know it to-day. It has now grown to quite large proportions and is doing good work, which is evidenced by the increasing support that we receive from industry and by the excellent help it seems to give to the winners. A recent survey of the careers of those who have won bursaries since 1946 has shown how many of them are now in industry, in free lance work or teaching. In the old days I think most people went into teaching, and now I am glad to say they seem to go into industry. A number of them have also acknowledged the great help that the bursary they won has been to them in finding and starting their careers. One of the awards we make each year is the Warner Memorial Medal, instituted in memory of the founder of the competitions.
>
> This exhibition of winning and commended designs has now become an important annual event. It is not only held in London: it also tours the different art schools in the country. At this moment, I understand, last year's exhibition is being shown at Melbourne in Australia, where it was especially asked for, so that Australians could see what the work of our students was like.
>
> In recent years the exhibition has been opened by someone prominent in industry or education, and this year we are singularly fortunate in having someone to perform this ceremony who qualifies under both heads. Mr. Whitney Straight is an industrialist and a man of business. He was Managing Director and then Deputy Chairman of B.O.A.C. from 1947 to 1955; he is now Deputy Chairman of Rolls Royce Ltd., and a Director of the Midland Bank. Mr. Whitney Straight's interest in industrial design is marked of course by his

Fellowship of this Society, and by his being a member of the Council of Industrial Design and also of the newly appointed National Advisory Council on Art Education. He is a very busy man therefore, and we are all the more grateful to him for coming here to-day.

I will now ask Mr. Whitney Straight to open this Exhibition.

MR. WHITNEY STRAIGHT *then spoke as follows:*

Many of you here to-day are already well familiar with the work we see on these walls, and of course a lot of you have taken an active part in producing the work. For me it is new and an exciting experience. I am really greatly impressed by what I have seen this morning. I have always thought that some sort of combination of brains, taste and imagination is really important and the most valuable potential export that this country could have. What I have seen here this morning shows many excellent examples of just this, and in a very wide variety of different applications.

It is good that the number of competitors has increased, it is good that the number of bursaries has also increased. I trust that the sponsors feel satisfied with the results that have been achieved and will from enlightened self-interest be even more generous in the future.

I must tell you frankly, however, that I feel that the whole scope of the exercise is too small in relation to the real needs of industry. By real needs I mean the things that industry ought to want. Furthermore, there are many areas of industry that are not represented here at all. I hope that in the future there will be an increase in diversity as well as an increase in quantity.

You all know already that things are going to be increasingly tough on the selling side, and that means that we all have got to make an extra effort in the future, particularly in relation to what goes on abroad. Therefore, it seems to me very appropriate that these bursaries should be travelling bursaries. Those of you who have been lucky enough to win them will have gone out and seen what the foreign customer wants, not second-hand but first hand. You will also, I hope, have made contacts which will enable you to get some idea of what the foreign manufacturer has it in mind to do. Any firm that you subsequently join will certainly benefit from your experience.

Now I just want to say a word about industry. You will be going into industry, some of you are already there. Forgive me for being frank about this—but don't be too long-haired in your approach, don't regard yourselves as something rather special; the sooner you can get recognized and accepted as part of a team making a product, the sooner you are going to get on, and the better it will be for the product. You have a very important part to play, but it requires tact, patience, diplomacy and, of course, drive and ruthlessness as well.

I should like to see those of you who go into industry get the message across to board level, because too many companies in this country are still not really aware of these things, and it is not much use having people aware down the line if they do not get strong encouragement from above.

Now another duty you have got—I am sorry to be moralizing about all this—is to make the going for those who will follow you. Design is spread too thinly at the moment, horizontally and vertically, so you have a duty to let other people come in behind you so that there is an infiltration of design-conscious people at all levels in industry. Later, industry will realize that more of you are necessary, and therefore those of you who go in now are really ambassadors for the others.

You have got a wonderful career ahead of you. You like what you do and then get paid for doing it. What could be better than that? I wish all of us worked under the same conditions.

You have got the opportunity of making a better world for many people, a more attractive and a pleasanter world to live in, and I wish you the best of luck in doing it.

Thank you for asking me to-day.

MR. STRAIGHT *then declared the Exhibition open. The formal proceedings concluded with the following speech of thanks by* MR. OSWALD P. MILNE, F.R.I.B.A., J.P., *Chairman of Council of the Society:*

It is my pleasure this morning to thank Mr. Whitney Straight for coming to open this Exhibition, but before I do so, I should like to say a few words to the students who have entered this competition.

You probably know that the full title of this Society is the Royal Society for the Encouragement of Arts, Manufactures and Commerce. The Society was founded some two hundred years ago and the man who inspired it was named William Shipley. He was an unassuming man but he grasped the great idea—and it was at a time when industry was passing from being a local affair to a national and even world-wide one—that invention linked with industry would increase the number of goods, and this would benefit the lot of mankind. But he was a drawing master, and so he felt in his bones that if goods were made in greater volume, then at any rate the artist should be brought into business: that there should be co-operation between the maker of the goods and the artist and the designer, so that the goods might be really fine goods. That was the inspiration of the Society in its early days. Then came the pressure of the industrial revolution in the nineteenth century, and by degrees goods were made in great quantities and people got the idea that the machine had only got to turn them out, and from that time people began to think that art was mainly a matter of painting pictures and making sculpture and it became known as 'fine art'. The artist, if he was employed in industry at all, was expected to do little more than put in the pretty bits and add patterns to the surface of the goods so as to make them just palatable. Well, now the whole outlook has changed and I am sure that publicly and industrially it is recognized that there should be a marriage between the artist and the manufacturer. It is quite clear that if the manufacturers ask the assistance of the artist, then the artist has got to understand technically the manufacturer's aims. It is no good your just being artists who can make pretty drawings and designs on paper; you have got to understand the material you are dealing with in every sense, the techniques of manufacture and also the economics of the whole job. Then, as Mr. Whitney Straight has said, you can become a useful member of the team which is so necessary in industry.

We asked Mr. Whitney Straight here because he understands these things. He himself makes, or is responsible for, the finest engines in the world. He knows perfectly well that in the making of those engines he has to have not only fine materials, but good and ingenious designers; he has to recruit the brains of all kinds of people, technicians, designers and craftsmen. Mr. Whitney Straight not only knows how to make fine engines, but he knows, from his own experience, what is required of them. He has been a racing motorist himself, he has been an airman, he knows what stresses and strains they must stand up to. It is that sort of comprehensive knowledge that is wanted from you when you go into industry.

We in this Society offer these bursaries so that, having learnt the elements of your trade in the art school, you can gain experience by going abroad and thus widen your outlook, learn what goods are required and how in other countries they meet design problems. Alternatively, you can use your bursaries to increase your technical knowledge of materials and methods of

production in the factory. It is that sort of knowledge which the industrial artist must have to-day. As Mr. Whitney Straight has said, you have perhaps to be one of a team, and have got to fit in. You are ambitious to go into industry, and I am sure that if you look at the future in that spirit you will make good.

I know I am only voicing all your thanks when I say to Mr. Whitney Straight that we are delighted that he has come here to-day and by doing so has given encouragement to arts, manufactures and commerce.

A vote of thanks to Mr. Whitney Straight was carried with acclamation.

The Exhibition was on view in the Society's rooms until 3rd June. It will be shown at the Belfast College of Art from 5th to 24th September; at the Liverpool College of Art from 3rd to 22nd October; at the Coventry College of Art from 7th to 26th November; at the Sunderland College of Art from 5th to 17th December, and at the Sheffield College of Art from 16th January to 4th February, 1961.

HONORARY CORRESPONDING MEMBER OF THE SOCIETY

Mr. W. A. Taylor, M.Arch., F.A.I.A., who was until recently the Society's Honorary Corresponding Member in Washington, D.C., is shortly leaving this area to take up the post of Professor of Architecture and Director, School of Architecture, University of Ohio, Athens, Ohio. The Council has now appointed Mr. Taylor to be Honorary Corresponding Member in Ohio and adjoining States. The post of Honorary Corresponding Member for Washington will be filled at a later date.

MEETING OF COUNCIL

A meeting of Council was held on Monday, 13th June. Present: Mr. Oswald P. Milne (in the Chair); Mrs. Mary Adams; Sir Hilary Blood; Lord Bossom; the Honble. G. C. H. Chubb; Mr. R. E. Dangerfield; Mr. Geoffrey de Freitas; Sir George Edwards; Mr. P. A. Le Neve Foster; Mr. E. Maxwell Fry; Mr. John Gloag; Sir Ernest Goodale; Professor R. Y. Goodden; Dr. Stanley Gooding; Dr. R. W. Holland; Mr. Antony Hopkins; Mr. Edgar Lawley; Sir Gilbert Rennie; Mr. A. R. N. Roberts; Professor S. Tolansky; Mr. G. E. Tonge; Mr. C. M. Vignoles; Mr. Hugh A. Warren and Miss Anna Zinkeisen; with Dr. K. W. Luckhurst (Secretary), Mr. G. E. Mercer (Deputy Secretary), and Mr. J. S. Skidmore (Assistant Secretary).

ELECTIONS

The following Fellow of the Society was appointed a Benjamin Franklin Fellow:

Boudreau, James Clayton

The following candidates were duly elected Fellows of the Society (those whose names are marked with an asterisk were elected Benjamin Franklin Fellows):

Akinyele, Gilbert Iranola, London.
Allen, George Lawrence, F.S.A.Scot., Edinburgh.
Austen-Clark, Mrs. Dorrit Ida Else Ratzer, London.
Barnett, Clarence, Hessle, Yorks.
Barnett, Richard, Bolton, Lancs.
Bartlett, Mrs. Edith B. M., Belfast, Northern Ireland.
Bastable, Bartholomew John, Dublin, Eire.
Béraud, Jean, F.R.S.C., Westmount, P.Q., Canada.
*Calvin, Professor Melvin, D.Sc., Ph.D., Berkeley, California, U.S.A.
*Chapman, Dave, Chicago, Illinois, U.S.A.
*Chermayeff, Professor Serge, F.R.I.B.A., Cambridge, Mass., U.S.A.
Clarke, Gilmore D., B.S., L.H.D., New York, N.Y., U.S.A.
Cooper, Alan Henry, N.D.D., Gravesend, Kent.
*David, Henry, M.A., Ph.D., New York, N.Y., U.S.A.
Davis, John Francis, N.D.D., A.T.D., Gloucester.
De Smet, Mlle. Odile, Brussels, Belgium.
Donn, The Reverend Thomas Mackenzie, M.A., F.S.A.Scot., Carr Bridge, Inverness.
*Dreyfuss, Henry, South Pasadena, California, U.S.A.
*Eames, Charles O., Venice, California, U.S.A.
Eastbury, John, Crawley, Sussex.
Easton, William White, B.Sc., Ph.D., F.R.I.C., Thurso, Caithness.
Eccles, Albert E., Bridgeport, Connecticut, U.S.A.
Falconer, Hugh Mallory, Plymouth, Devon.
Flint, Geoffrey John William, A.R.C.A., Eastbourne, Sussex.
Francis, Benjamin, Ardrossan, Ayrshire.
*Fuller, Professor Richard Buckminster, Carbondale, Illinois, U.S.A.
Gimesy, Oscar Andrew Tibor, B.E., M.Arch., A.R.I.B.A., Sandringham, Victoria, Australia.
*Goldstein, Professor Sydney, M.A., Ph.D., Cambridge, Mass., U.S.A.
*Girard, Alexander Hayden, A.I.A., Santa Fé, New Mexico, U.S.A.
Goodall, Norman, A.L.A., Hinckley, Leicestershire.
Greaseley, George, A.C.G.I., D.I.C., M.I.E.E., A.M.I.Mech.E., Birmingham.
*Gropius, Professor Walter A. G., M.A., Lincoln, Mass., U.S.A.
Grywalski, Stanley, M.A., B.Ed., Calgary, Alberta, Canada.
Harper, Thomas Roy, Chester, Cheshire.
Harris, Huntington, Ph.D., Leesburg, Virginia, U.S.A.
*Hitchcock, Professor Henry Russell, A.M., Northampton, Mass., U.S.A.
Hughes, David Thomas, Llanelly, Carms.
Jones, Miss Valerie Marjorie, N.D.D., Coventry.
Koskie, Jack Louis, Taroona, Tasmania.
Latham, Professor Peter Morton Sturges, M.A., B.Mus., London.
*Lauck, C. Harold, Lexington, Virginia, U.S.A.
Macdonald, Archibald William, D.A., A.T.D., Oldham, Lancs.
Macdonell, Mrs. Rose, London.
McPherson, John, M.A., Alloway, Ayr, Scotland.
Marshall, Arthur, Sheffield.
Martin, James, D.A.(Edin.), Canterbury, Kent.
Menut, Professor Albert Douglas Bartlett, A.B., Ph.D., Syracuse, N.Y., U.S.A.
Morris, Michael Archibald Vallens, Sherborne, Dorset.

*Nelson, George, New York, N.Y., U.S.A.
Newsham, Robert, N.D.D., A.T.D., Shipley, Yorkshire.
*Odishaw, Hugh, M.A., B.S., Washington, D.C., U.S.A.
Onimole, Michael Olusola, Ibadan, Western Nigeria.
Owens, Professor Hubert B., B.S., M.A., Athens, Georgia, U.S.A.
Pask, Mrs. Olga Denise, Enfield, Middx.
*Pauling, Professor Linus Carl, Sc.D., Ph.D., Pasadena, California, U.S.A.
Penniall, Miss Moyra Edna, Chelmsford, Essex.
Roche, The Honble. Mr. Justice John Redmond, O.B.E., Q.C., Westmou P.Q., Canada.
Roerig, Leslie Ronald, Braintree, Essex.
*Saarinen, Eero, B.F.A., Birmingham, Michigan, U.S.A.
Sharp, Edward, A.R.C.A., Loughborough, Leicestershire.
*Struve, Otto, Ph.D., Green Bank, West Virginia, U.S.A.
Tinling, Banastre Tarleton, St. Helens, Lancs.
Vallerand, Jean, B.A., Litt.L., F.R.S.C., Montreal, P.Q., Canada.
Webster, Ronald Graham, Lusaka, Northern Rhodesia.
*Wiener, Professor Norbert, A.M., Ph.D., Belmont, Mass., U.S.A.
Wood-Jones, Raymond Bernard, B.Arch., M.A., Ph.D., F.S.A., A.R.I.B.A., Cheadle, Cheshire.
Withnell, William, B.A., Saint Didier au Mont d'Or, Rhône, France.

The following Company was admitted into association with the Society:

Vauxhall Motors Limited, Luton, Bedfordshire.

VACANCIES ON COUNCIL

It was reported that Professor Simon Lissim had accepted nomination for election as a Vice-President of the Society, and that Lord Conesford, Professor Sir Charles Dodds, Mr. J. C. Jones and Lord Netherthorpe had accepted nomination for election as Members of Council.

APPOINTMENT OF HONORARY CORRESPONDING MEMBER

Approval was given to the appointment of an Honorary Corresponding Member of the Society in Ohio and the adjoining States of the U.S.A. (see separate Notice on p. 555).

EXAMINATIONS

It was reported that 80,233 and 228,154 entries had been received for the Whitsun and Summer series of examinations respectively, an increase of 13,607 and 28,862 over the corresponding figures for the previous year. The total of 409,223 for examination entries in the present session exceeded the record figure reached in 1958/9 by 62,956.

ANY OTHER BUSINESS

A quantity of financial and other business was transacted.

FINANCIAL STATEMENTS FOR 1959

The following statements are published in accordance with Section 25 of the Society's Bye-laws

BALANCE SHEET, 31st December, 1959

1958		£	£
	General Fund Accounts—		
	General Purposes Capital Account per annexed account		
86,371	(page 562)	81,307	
6,008	Dr. Cantor's Bequest	6,008	
2,548	Lord Bennett's Bequest	2,548	
7,468	Henry Morley's Bequest	7,468	
2,163	Dorothy Corfield's Bequest	2,196	
500	J. A. Milne's Bequest	500	
	Life Composition Account (page 562) :		
	Unexpired balance of compositions received on the basis of taking credit for such compositions over		
11,617	a period of 12 years from their receipt	12,188	
116,675			112,215
	Specific Fund Accounts (page 562)—		
—	Premises Purchase Fund Account	21,248	
—	Premises Maintenance Fund Account	741	
	Amount accumulated towards pensions payable under		
9,457	Modified Superannuation Scheme	9,233	
	Provision for Rehabilitation of Building, including		
760	£500 gift in memory of the late Lord Amulree ...	735	
338	Industrial Art Bursaries Fund Account	435	
1,428	Fund for House Extension...	—	
11,983			32,302
10,000	**Mortgage**—6/8 John Adam Street		9,500
	Other Liabilities—		
13,715	Creditors	13,889	
5,018	Industrial Art Bursaries awarded (but not expended) ...	6,323	
	Uninvested Trust Capital :		
1	Cadman Memorial Fund	1	
261	Dr. Swiney's Bequest	1,047	
2,531	Unexpended Trust Income (page 564)	2,494	
	Contributions received for Industrial Art Bursaries to		
31	be awarded in 1960	181	
21,557			23,935
160,215	Carried forward		178,042

			1958
	£	£	£
General and Specific Fund Assets—			
Freehold Property, 6/8 John Adam Street			
Cost in 1922, plus additions, *less* sales and compensation received		49,788	49,788
Note : Expenditure in connection with adjoining Leasehold Property has been written off in previous years to Capital Account.			
Pictures, Books, Furniture and Fixtures (as fixed in 1919 : subsequent additions have been written off) ...		10,000	10,000
Investments :			
Freehold Ground Rents, at cost	1,229		1,229
Securities (page 563) :			
General (Market Value £37,881—1958 £37,211)	45,684		45,684
Dr. Cantor's Bequest (Market Value £4,355—1958 £4,324)	5,941		5,941
Lord Bennett's Bequest (Market Value £1,867—1958 £1,854)	2,548		2,548
Henry Morley's Bequest (Market Value £5,474—1958 £5,435)	7,468		7,468
Dorothy Corfield's Bequest (Market Value £1,585—1958 £1,542)	2,151		2,119
J. A. Milne's Bequest (Market Value £438—1958 £432)	500		500
Premises Purchase Fund (Market Value £17,831)	16,500		—
Held towards meeting pensions payable under Modified Superannuation Scheme (Market Value £7,368—1958 £7,164)	8,238		8,238
Fund for Rehabilitation of Building (Market Value £2,075—1958 £2,025)	2,500		2,500
		92,759	76,227
		152,547	136,015
Stocks of Stationery and Working Papers of Examinations Department at value estimated by the Society's printer	5,410		4,745
Debtors and Payments in Advance	5,698		3,012
Balances with Bankers and Cash in Hand	14,387		11,443
		25,495	24,200
Carried forward		178,042	160,215

1958				1958			
£		£	£		£	£	£
160,215	Carried forward		178,042	Carried forward		178,042	160,215

BALANCE SHEET, 31st December, 1959—*continued.*

1958					1958			
£			£	£		£	£	£
160,215	Brought forward			178,042	Brought forward		178,042	160,215
	Trust Fund Accounts—				**Trust Fund Assets—**			
33,103	Capital Account : Balance at 31st December, 1958 ...	33,188			Capital : Investments (page 564) :			
85	*Add :* Profit on Sale of Freehold Ground Rents ...	264			Freehold Ground Rents, at cost ...	721		1,243
33,188			33,452		Securities (Market Value £23,683—1958 £23,630)	30,683		30,683
3,364	Unexpended Income (net)	3,327			Cottages at Drayton St. Leonards ...	1,000		1,000
36,552				36,779		32,404		32,926
					Uninvested Funds	1,048		262
						33,452		33,188
						£		
					Income : Investments (page 564) :	833		833
					(Market Value £778—1958 £772)			
					Due from the Society	2,494		2,531
						3,327		3,364
							36,779	36,552
					On behalf of the Council			
					OSWALD P. MILNE, *Chairman.*			
					F. A. MERCER, G. E. TONGE, } *Treasurers.*			
£196,767				£214,821			£214,821	£196,767

Notes :

(1) Credit has been taken for the whole of the subscriptions received during the year, although some relate to periods expiring after the date of the Balance Sheet, but no credit has been taken for subscriptions due but unpaid at 31st December, 1959.

(2) The balances standing to the credit of the various Fund Accounts are subject to the market value of the relative investments, the majority of which are dated stocks.

Report of the Auditors to the Council and Fellows of the Royal Society of Arts.

We have examined the above balance sheet and annexed income and expenditure account which in our opinion respectively give a true and fair view of the state of the affairs of the Society at 31st December, 1959, and of its income and expenditure for the year ended on that date according to the best of our information and the explanations given to us and as shown by the books.

3 London Wall Buildings,
London, E.C.2.
17th June, 1960.

DELOITTE, PLENDER, GRIFFITHS & CO., *Chartered Accountants.*

INCOME AND EXPENDITURE ACCOUNT

for the Year ended 31st December, 1959

EXPENDITURE

1958		£	£
£			
	Printing and Publishing *Journal*—		
6,181	Printing and Paper	6,062	
1,487	Postages...	1,477	
379	Reviews and other expenses	709	
8,047			8,248
630	Library—Books, etc.		554
79	Cost of Albert and Society's Medals and R.D.I. Expenses		119
	Industrial Art Bursaries—		
200	Contribution to Fund	200	
381	Expenses of Competition	404	
581			604
175	Cantor and Morley Lectures		195
	Examination Expenses (other than salaries and wages)—		
22,473	Examiners' Fees	28,376	
13,340	Stationery and Printing Materials	15,529	
3,354	Rent and Rates	3,305	
2,366	Printing Department Expenses other than materials	1,327	
2,821	Postages, Carriage and Telephone	3,633	
2,093	Lighting, Heating, Cleaning, Office Equipment and other expenses	2,989	
1,154	Prizes and Certificates...	1,183	
596	Invigilators' Fees and Expenses	430	
796	Proportion of House and Office Expenses as below	773	
48,993			57,545
58,505	Carried forward		67,265

INCOME

1958		£	£	£
£				
20,033	Annual Subscriptions received during year		21,763	20,033
796	Registration Fees		907	796
3,092	One-twelfth of Life Compositions received during twelve years to date		2,159	3,092
	Income from—			
45	Ground Rents	45		45
1,711	General Fund Investments	1,711		1,711
212	Dr. Cantor's Bequest	212		212
91	Lord Bennett's Bequest	91		91
266	Henry Morley's Bequest	266		266
76	Dorothy Corfield's Bequest	76		76
21	J. A. Milne's Bequest	21		21
281	Trust Funds for General Purposes	270		281
49	Bank and Deposit Accounts...	304		49
2,752			2,996	2,752
828	Sales of *Journal*, etc.	784		828
1,086	Advertisements in *Journal*	791		1,086
1,914			1,575	1,914
74,980	Examination Fees	94,553		74,980
4,706	Sales of Examination Papers and Advertisements ...	6,141		4,706
79,686			100,694	79,686
10,018	Rents, etc. (including £2,837 charged to Examinations Department)		12,364	10,018
117,291	Carried forward		142,458	117,291

1958		£	£
58,505	Brought forward		67,265
36,668	Salaries, Wages and Superannuation Scheme		42,319
9,250	Rent Payable		8,862
77	Interest on Mortgage		621
	House and Office Expenses—		
1,568	Rates and Insurance	1,497	
531	Repairs, Renewals and Decorations	465	
—	Restoration of Paintings	600	
3,198	Lighting, Heating, Cleaning, Expenses of Meetings and General Charges	3,040	
2,663	Stationery, Printing, Postages, Telephone, Audit and Accountancy and other Office Expenses ...	2,124	
7,960		7,726	
796	*Less :* Proportion (10 per cent.) allocated to Examinations above	773	
7,164			6,953
726	*Commission on Lettings to Sub-Tenants*		—
1,223	Pensions	1,327	
519	*Less* : Charged against Modified Superannuation Scheme Fund Account	519	
704			808
—	Annual transfer to Premises Maintenance Fund Account		1,500
—	Annual transfer to Premises Purchase Fund Account ...		5,000
	Balance of Income dealt with as follows :—		
	One-half carried Premises Purchase Fund Account	4,565	
	One-half carried to General Purposes Account	4,565	
4,197			9,130
£117,291			£142,458

1958		£	£
	Brought forward	142,458	117,291
		£142,458	£117,291

GENERAL PURPOSES CAPITAL ACCOUNT

for the Year ended 31st December, 1959

1958		£		£	1958
£					£
—	Amount transferred to Premises Purchase Fund Account	10,000	Balance at 31st December, 1958 ...	86,371	91,155
11,390	*Structural alterations and furnishings*	—	Ancient Lights Compensation ...	322	3,350
	Legal and other Professional Charges in connection with Ancient Lights and Mortgage, less contribution received £1,500		Proceeds inf Sale of Books from Library	6	—
701		—	Donation	21	—
	Legal Charges re 2/4 John Adam Street and 18 Adam Street		Sales of "History of the R.S.A." ...	22	—
240		—	Amount transferred from Income and Expenditure account	4,565	4,197
86,371	Balance per Balance Sheet	81,307			
£98,702		£91,307		£91,307	£98,702

LIFE COMPOSITION ACCOUNT for the Year ended 31st December, 1959

1958		£		£	1958
£					£
	Amount taken into the Society's Income—		Balance at 31st December, 1958 ...	11,617	11,521
	One-twelfth of Compositions received during twelve years to date	2,159	Compositions received during year ...	2,730	2,188
2,092					
11,617	Balance per Balance Sheet	12,188			
£13,709		14,347		£14,347	£13,709

SPECIFIC FUND ACCOUNTS for the Year ended 31st December, 1959

1958		£		£	1958
£					£
	Premises Purchase Fund Account—		**Industrial Art Bursaries Fund Account—**		
	Amounts transferred from:		Balance at 31st December, 1958 ...	338	370
	General Purposes Capital Account £10,000		Contributions from Trust Funds :		
	Fund for House Extension... 1,452		Art Congress Studentship £150		200
	Income and Expenditure Account 9,565		Owen Jones Memorial Fund 125		—
—		21,017		275	200
—	Interest on Investments	216	Contributions from the Society 200		200
—	Contributions from Members ...	15	Other Contributions ... 4,047		2,868
—	Balance at 31st December, 1959 ...	£21,248		4,522	3,268
				4,860	3,638
	Premises Maintenance Fund Account —		*Deduct :* Bursaries awarded for 1959 4,425		3,300
£		£	Pamphlets and other expenses ... 404		331
—	Amount transferred from Income and Expenditure Account	1,500		4,829	3,631
—	*Deduct :* Maintenance charged against Fund	759	*Less :* Pamphlets and other expenses charged against Income and Expenditure Account 404		331
—	Balance at 31st December, 1959 ...	£741		4,425	3,300
			Balance at 31st December, 1959 ...	£435	£338
	Amount accumulated towards pensions payable under Modified Superannuation Scheme—				
£		£	**Fund for House Extension—**	£	£
9,632	Balance at 31st December, 1958 ...	9,457	Balance at 31st December, 1958 ...	1,428	1,252
294	*Add :* Interest on Investments ...	295	*Contributions received in 1959* ...	—	100
9,976		9,752	Deposit Interest	24	46
519	*Deduct :* Proportion of Pensions paid during year ...	519		£1,452	£1,423
£9,457	Balance at 31st December, 1959 ...	£9,233	Balance transferred to Premises Purchase Fund Account	£1,452	—
	Provision for Rehabilitation of Building—				
£		£			
786	Balance at 31st December, 1958 ...	760			
75	*Add :* Interest on Investment ...	75			
861		835			
101	*Deduct :* Repairs and Renewals charged against Fund ...	100			
£760	Balance at 31st December, 1959 ...	£735			

INVESTMENTS

31st December, 1959

		Cost
	SOCIETY	£
£5,000	British Transport 3 per cent. Stock 1978/88	4,820
£10,000	3½ per cent. Conversion Stock 1969	10,189
£24,370	British Electricity 4½ per cent. Stock 1974/79	25,871
£7,000	2½ per cent. Consolidated Stock	4,804
		£45,684

		Cost
	Dr. Cantor's Bequest	
£6,048	3½ per cent. Funding Stock 1999/2004	£5,941

		Cost
	Lord Bennett's Bequest	
£2,593	3½ per cent. Funding Stock 1999/2004	£2,548

		Cost
	Henry Morley's Bequest	
£7,603	3½ per cent. Funding Stock 1999/2004	£7,468

		Cost
	Dorothy Corfield's Bequest	
£2,202	3½ per cent. Funding Stock 1999/2004	£2,151

		Cost
	J. A. Milne's Bequest	
£609	3½ per cent. Funding Stock 1999/2004	£500

		Cost
	Premises Purchase Fund	
1,250	I.C.I. Ltd. £1 Ordinary Shares	£2,469
£2,615	London County Council 5 per cent. Stock 1980/1983	2,512
£4,950	5½ per cent. Conversion Stock 1974	5,019
£3,323	New Zealand 4½ per cent. Loan 1970/1973	3,000
£2,000	5 per cent. Defence Bonds	2,000
£1,500	Somerset County Council 5½ per cent. Mortgage Loan	1,50
		£16,500

		Cost
	Modified Superannuation Scheme	
£4,709	4 per cent. Funding Stock 1960/90	£4,709
£1,536	3 per cent. Funding Stock 1959/69	1,529
£2,000	3 per cent. Savings Bonds 1960/70	2,000
		£8,238

		Cost
	Fund for Rehabilitation of Building	
£2,500	3 per cent. Savings Bonds 1960/70	£2,500

		Cost or value when received in trust	
	Trust Funds		
	Dr. Aldred Trust.		
£142	3½ per cent. Funding Stock 1999/2004		£140
	Art Congress Studentship		
£1,495	3½ per cent. Funding Stock 1999/2004		1,469
	R. B. Bennett Empire Prize Trust.		
£1,463	3½ per cent. Funding Stock 1999/2004		1,437
	Sir George Birdwood Memorial Fund.		
£678	3½ per cent. Funding Stock 1999/2004		666
	Selwyn Brinton Trust.		
£1,013	3½ per cent. Funding Stock 1999/2004		995
	Alfred Davies Bequest.		
£1,988	3½ per cent. Funding Stock 1999/2004		1,953
	Le Neve Foster Trust.		
£372	3½ per cent. Funding Stock 1999/2004		366
	John Fothergill Trust.		
£251	3½ per cent. Funding Stock 1999/2004		247
	Thomas Gray Memorial Trust.		
	Capital Account :		
£9,048	3½ per cent. Conversion Stock 1961 or after	£7,000	
£1,174	3½ per cent. War Stock 1952 or after	995	
£212	British Transport 3 per cent. 1978/88	179	
£760	3½ per cent. Funding Stock 1999/2004	730	
	Income Account : £475 3½ per cent. Funding Stock 1999/2004	383	
			9,287
	Howard Trust.		
£472	3½ per cent. Funding Stock 1999/2004		463
	Owen Jones Memorial Trust.		
£480	3½ per cent. Funding Stock 1999/2004		472
	Neil Matheson McWharrie Trust.		
£338	3½ per cent. Funding Stock 1999/2004		332
	Dr. Mann Trust.		
£949	3½ per cent. Funding Stock 1999/2004		932
	Mulready Trust.		
£102	3½ per cent. Funding Stock 1999/2004		100
	North London Exhibition Trust.		
£135	3½ per cent. War Stock 1952 or after		185

INVESTMENTS—*continued*

Sir William J. Pope Memorial Fund.			
£345 3½ per cent. Funding Stock 1999/2004			£339
Russian Embassy Prize.			
£92 3½ per cent. Funding Stock 1999/2004			91
Benjamin Shaw Trust.			
£86 3½ per cent. Funding Stock 1999/2004			85
John Stock Trust.			
£64 3½ per cent. Funding Stock 1999/2004			63
Dr. Swiney's Bequest.			
Freehold Ground Rents	£721		
£5,391 3½ per cent. Funding Stock 1999/2004	5,082		
		5,803	
Trueman Wood Lecture Endowment Fund.			
£860 3½ per cent. Funding Stock 1999/2004			844
Cadman Memorial Fund.			
£358 3½ per cent. Funding Stock 1999/2004			351
Thomas Holland Trust.			
£414 3½ per cent. Funding Stock, 1999/2004			406
E. Frankland Armstrong Trust.			
£527 3½ per cent. Funding Stock 1999/2004			518
Joseph Paxton Memorial Trust.			
£1,147 3½ per cent. Funding Stock 1999/2004			1,127
A. C. Bossom Lecture Endowment Fund.			
£585 3½ per cent. Funding Stock 1999/2004			575
Fred Cook Memorial Lecture Fund.			
£1,008 3½ per cent. Funding Stock 1999/2004			1,000
Fred Henry Andrews' Bequest.			
£1,252 3½ per cent. Funding Stock 1999/2004			1,000
James Cranstoun Bequest			
Capital Account : £556 Agric. Mortgage Corpn. 4½ per cent. Deb. Stock 1961/91	£541		
Cottages—Drayton St. Leonard	1,000		
Income Account : £605 3½ per cent. Funding Stock 1999/2004	450		
		1,991	
		£33,237	
Representing : Capital Account		32,404	
Income Account		833	
		£33,237	

TRUST INCOME AND EXPENDITURE
for the year ended 31st December, 1959

	Unexpended Income 1st Jan. 1959.	Income received during year.	Expenditure on lectures, prizes and administration.	Amount applied to Society's General Purposes.	Unexpended Income carried forward 31st Dec. 1959.
	£	£	£	£	£
Dr. Aldred Trust	34	5	—	—	39
Art Congress Studentship	150	52	155	—	47
R. B. Bennett Empire Prize Trust	120	51	2	—	169
Sir George Birdwood Memorial Fund	153	23	33	—	143
Selwyn Brinton Trust	393	35	1	—	427
Alfred Davies Bequest	—	70	—	70	—
Le Neve Foster Trust	11	13	11	—	13
John Fothergill Trust	40	9	10	—	39
Thomas Gray Memorial Trust	515	407	299	—	623
Howard Trust	80	16	50	—	46
Owen Jones Memorial Trust	166	17	126	—	57
Neil Matheson McWharrie Trust	10	11	—	—	21
Dr. Mann Trust	—	33	33	—	—
Mulready Trust	14	3	—	3	14
North London Exhibition Trust	110	5	1	—	114
Sir William J. Pope Memorial Fund	46	12	1	—	57
Russian Embassy Prize	58	4	1	—	61
Benjamin Shaw Trust	4	3	—	—	7
John Stock Trust	59	2	—	—	61
Dr. Swiney's Bequest	200	237	200	197	40
Trueman Wood Lecture Endowment Fund	29	30	33	—	26
Cadman Memorial Fund	41	12	—	—	53
Thomas Holland Trust	25	14	15	—	24
E. Frankland Armstrong Trust	49	18	25	—	42
Joseph Paxton Memorial Trust	263	40	2	—	301
A. C. Bossom Lecture Endowment Fund	37	20	16	—	41
Fred Cook Memorial Lecture Fund	59	35	27	—	67
Fred Henry Andrews' Bequest	104	44	2	—	146
James Cranstoun Bequest	594	81	26	—	649
	£3,364	£1,302	£1,069	£270	£3,327
Represented by : Amount due by Society					2,494
Balance invested as above					833
					£3,327

MODERN TRENDS IN INDUSTRIAL DESIGN

The first of two papers by

SIR GORDON RUSSELL, C.B.E., M.C., R.D.I.,

lately Director, Council of Industrial Design, read to the Society on Wednesday, 9th December, 1959, with Professor R. Y. Goodden, C.B.E., R.D.I., Master of the Faculty of Royal Designers for Industry, in the Chair

THE CHAIRMAN: It is my privilege, my great pleasure and my advertised duty, to introduce Sir Gordon Russell to you. How many meetings, I wonder, about to be addressed by a very distinguished speaker, have been fobbed off by a lazy chairman with the age-old formula: 'The speaker needs no introduction from me'. In view of the identity of this afternoon's speaker and of his subject, and of the ægis under which we meet (and indeed of yourselves), this meeting is going to be fobbed off as never before. Sir Gordon Russell.

The following paper, which was illustrated with lantern slides, was then read.

THE LECTURE

It is only comparatively recently that the term 'industrial design' has become at all widely known. It is, in fact, a profession which production by machine has brought into being. But it developed very slowly because people did not realize at first how fundamental was the difference in designing for machine, as compared with hand, production. The fortunes which the machine could build up in a few years tended to obscure its misuse, the ugliness of its products, the lack of any planning and the meanness of the workers' houses in the new industrial towns. William Morris saw it, quite rightly, as a social problem, which he felt could be cured by a return to small scale craft workshops. His founding of the Arts and Crafts movement was indeed a revolt against all kinds of ugliness. But there were some among his disciples who felt that his solution was impracticable. They argued that the machine was not necessarily bad in itself: its direction was usually bad, and in some cases anti-social, yet to banish it would greatly reduce the physical standard of living. They founded the Design and Industries Association in 1915, a body which did—and is still doing—much to make manufacturers aware that there was at least a hope of making their products comely and shipshape by a more rational approach to the problem of design. They held that it was not an impossible aim to achieve a balance between hand and machine production, both of which should be good of their kind. They had, however, no illusions as to how difficult this would be. Most of these pioneers believed, as I do, that only out of a general high level of machine production can we expect hand workmanship to flourish once more. Greater leisure, which is already a possibility in industrialized countries, is encouraging some

people to use their hands in a variety of ways, thus becoming more knowledgeable and critical of workmanship, whilst the larger incomes which the machine enables people to earn are making it possible for them to own better things if they wish to do so. This, in its turn, depends on a much higher standard of general, and especially of visual, education. At the present time the regrettable tendency seems to be for workers to demand shorter hours merely in order to work overtime for a higher income instead of more leisure for a fuller and satisfying life.

The growing interest in good design was fostered also by the Royal Society of Arts which, in the period between the wars, did a great deal of pioneering work such as the exhibition at the Royal Academy in 1935, the institution of the Faculty of Royal Designers for Industry in 1936 and later the creation of Bursaries for designers. All these followed quite naturally the Society's competitions for designs for textiles and wallpapers in its earliest days. At that time—the end of the eighteenth century—'designs' meant 'patterns' for production by hand, interpreted as a rule by a comparatively simple process which could be assimilated rapidly by the artist. Industrial design—that is, designing for production in quantity by machine—does indeed include pattern but it ranges far wider than that and embraces form, texture, colour, convenience in use and so on. In America the term is generally used to denote engineering products, but in Britain we use it in a wider sense to cover all industries, including those in which handwork plays an important part such as, for instance, Stourbridge glass and certain types of leather goods, but not the production of individual craft workshops. It would be true to say that broadly the engineer is interested primarily in production and function, whereas the industrial designer is interested primarily in convenience and appearance in use, although of course in practice all these overlap to a varying extent. Collaboration between the two is of the greatest importance to-day.

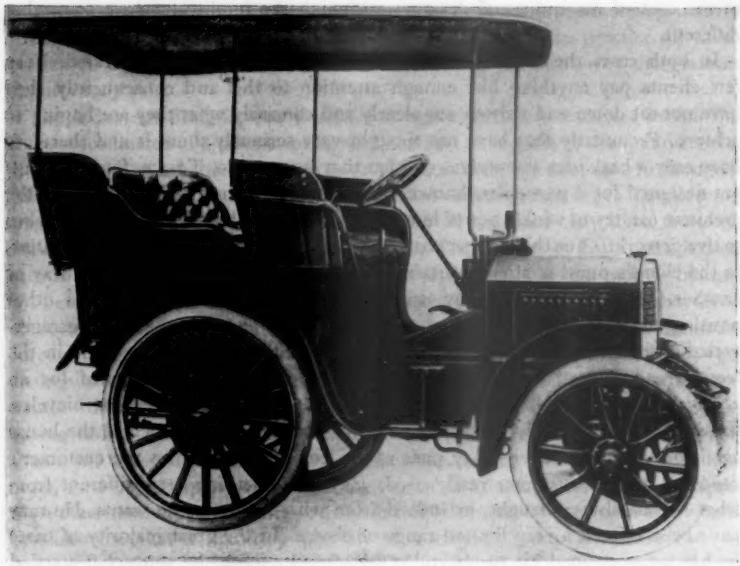
The industrial designer has much in common with the architect in that he is the co-ordinator of a team of experts. Their first concern is to design an article, be it a house or a kettle, which is entirely suitable for its purpose. In doing so they are dealing with ever more complicated techniques using a bewildering range of natural and synthetic materials, and all the time they have to watch closely the probable cost of the finished job. The danger in both cases is that with so much on his hands—and usually his work is wanted in a hurry—he may not have time to give, or may indeed not be capable of giving, his work that sense of style—so different from mere styling—which can only come from the perceptiveness of the trained artist and without which we shall never get distinguished architecture or industrial design. The so-called 'fine arts' need a rather different approach to the industrial arts in that the painter or sculptor, having rented a studio and bought his canvas, paints, brushes, chisels or stone, is to some extent his own master as to how he will set about the job and how much time he will spend on it. Like the rest of us he must earn a living, and the more conscientious he is the more difficult this becomes. Of course, in many cases he discovers that a flattering portrait or a cloying group is a sure road to commercial success under the conditions of to-day. But the industrial designer,

whose designs may be produced in very large batches, must also pay a great deal of attention to sales. It is important always to keep at the back of his mind the sobering thought that industrial design will never be improved in a vacuum; it must be nourished by sales. How to ensure this whilst maintaining a good all-round standard of quality presents the young designer with his greatest problem, a problem which remains a severe one even for the old hand. Indeed it is a problem which neither of them can solve alone: it depends on whether the outlook of the Board of Directors is a civilized one or not. It depends on welding the whole firm into a team which knows what good design is and believes in its bones that it is worth while. Only those who have worked for a client who is completely unaware of what one is trying to achieve will realize fully the appalling frustration of such a job. If capitalism is to rise to the challenge with which it is faced in the modern world, as I believe it can, it will have to accept far wider social responsibilities than many Boards do to-day.

The Ministry of Education has suggested in a recent Building Bulletin that for the architect design work can be divided into four stages, i.e., Brief, Investigation, Design, Working Drawings. (1) The Brief is receiving and obtaining adequate particulars of the client's requirements; (2) the Investigation is a preliminary study of possible forms of construction, etc., and the preparation of the sketch plan; (3) the Design is a detailed study on draft drawings of all parts of the building. At the end of this phase the architect should know exactly how the building will be put together in every detail; (4) Working drawings—a routine process of turning draft drawings into final drawings. All these stages hold good in the case of the industrial designer, although the implications are somewhat different.

In both cases the importance of the brief can hardly be exaggerated. Very few clients pay anything like enough attention to this and consequently they have not sat down and written out clearly and concisely what they are hoping to achieve. Frequently they have not thought very seriously about it and therefore have only a hazy idea themselves of what they hope to do. To-day few buildings are designed for a particular, known client for his own use. When they are, the architect can try to winkle out of him by question and observation how he wishes to live or work. Thus the architect can establish a rough and ready list of priorities, as the client's purse is almost certain to force him to compromise in one way or another. Most buildings to-day, such as offices or local authority and other housing, are designed to meet general requirements and many, such as garages, greenhouses and farm buildings, have become industrial products made in the factory and erected rapidly on the site and so have to be designed for an anonymous client. It is exactly the same with washing machines or bicycles, furniture or carpets. The danger here is that the middleman, such as the house agent or the retail buyer—may pose as the complete expert on the customer's needs. What the customer really needs may be something very different from what he has always bought, or indeed from what he thinks he wants. He may have been offered a very limited range of choice. In the great majority of cases he has never defined his needs and quite often he might be somewhat startled

This photograph and the illustrations which follow demonstrate a general tendency towards simplification in mechanical objects during the last century. Bearing in mind the complexity of 'Puffing Billy', it will be seen that the locomotive 'Folkestone' (above) *shown at the Great Exhibition of* 1851 *is a very straightforward piece of design. The same applies to King Edward VII's Daimler* (below) *and the Aston Martin, to the London 'bus and the aeroplane*



Aston Martin 1953 *saloon*

[*De Havilland*

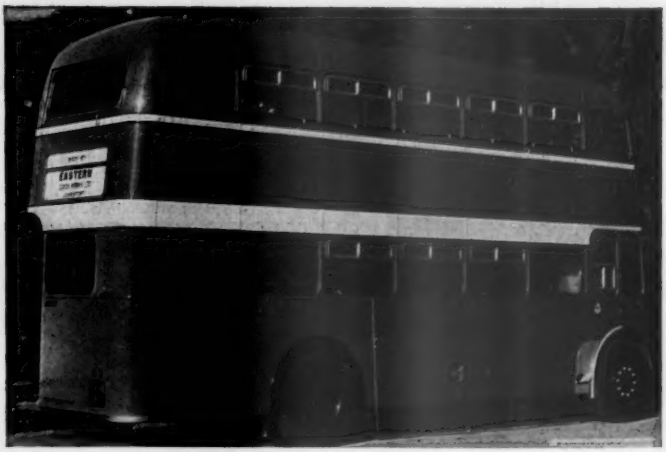
The second De Havilland aeroplane, 1910

[*De Havilland*

De Havilland 106—*Comet* 4 *jet airliner*, 1958

[*London Transport Executive*

'B' type motor omnibus, 1921



'Long Life' double-deck omnibus, designed by Eastern Coach Works Ltd., 1945

were he competent and determined to do so. It is not unlikely that he might take some time to get used to a new and perhaps more reasonable solution to his problem, but how can an advance be made if he is not shown what the possibilities are? The easiest thing to sell is one which is at least to some extent familiar and yet has superficial differences from last year's model.

The danger is greatly magnified to-day by the Consumer Preference Research tactics, which have been taken up with such gusto in America. We all know the nonsense exploited by many advertising agents—TEN MILLION AMERICAN WOMEN CAN'T BE WRONG, and so on. The idea is that by questioning a number of people—the greater the number the more impressive it is supposed to sound—the product is designed in such a way as to appeal to the greatest market. The system leads—if leading from behind can be called leading—through mass advertising to the acceptance of the lowest common denominator: because ugliness is to-day normal it is not therefore strange, and most people accept it without thinking. Many people dislike anything unusual on sight and it often saves the buyer trouble to show them things they know: whether these are ugly or not doesn't concern him. Nationalization has at least taught us that the larger the organization the greater is the pressure to stick to the book of rules for fear of creating a precedent. For instance, when canals were nationalized the last vestiges of a vigorous popular art—the painted decoration of barges which were the owners' pride and joy—was reduced to a dull and colourless mediocrity in order to make repainting a simple routine matter. It is to the growing body of rebels that I wish to appeal, and I think there is some hope that the commonsense, empirical approach of the English may enable us to avoid the more violent repercussions of pseudo-scientific juggling. There is to-day a strong case for the continuance of smaller firms which are less likely to be seduced by specious tales of gigantic markets, or to be able to bear the cost of such investigations. Indeed the trouble with them is that they may not pay enough attention to vital research into the customer's actual needs.

Broadly then the problem of improving design standards falls under two heads: stimulation of the making of and demand for things of better quality, including design. Why should this be so obviously necessary more than a hundred years after the arrival of the industrial revolution? Well, I suppose one could say that such a period is short indeed compared with mankind's more than 10,000 years' experience of hand production. During this time there have been four clearly defined phases: family production, hand production in back and front shop, series production by machine, and mass production.

Every primitive society starts to make articles to fill its everyday needs by family production. Whilst the woman makes cloth or cakes the man makes tools for hunting or tilling the soil. The method obviously imposes limitations on a standard of living because few people can become masters of a great variety of crafts in their lifetime. But it has this great advantage, the feeling of responsibility is strong and direct. There is no question of making an article down to a cut price: indeed money seldom passes, and there is the strongest possible incentive to make each thing as well as skill admits, because the person for whom

it is being made is known, and criticism of failure or delay will be both severe and immediate.

Yet it soon became obvious that specialization would lead to better results and the earliest towns gave an opportunity for such development which did not exist in small and scattered communities. Workers in wood, bronze, stone and clay became much more expert in their own range and were able to exchange their products for a wider range of things and to impart their growing body of knowledge to succeeding generations. Indeed whole towns became famous for some particular product usually as a result of the occurrence locally of specially suitable raw materials or a particular variety of skill. But the unit of production remained small—a workshop with a few men in it and a front shop attached to it. Even to-day the word 'shop' means equally a place where goods are made or sold. When a customer entered the latter he was looked after as a rule by someone who left his bench in the back shop. Business was a local affair owing to difficulties and dangers of transport, the customer was known and the salesman was knowledgeable about his goods because he actually made them. The sense of responsibility was still direct and strong. But in highly prized products which could be made only in certain areas where the climate was favourable, merchants developed great trades abroad at a very early date in spite of all the risks. However, it is noticeable that the immense and immediate cash profit which followed the lowering of standards led to many attempts to regulate quality on the part of honest makers, who realized that the good repute of the whole trade was of fundamental importance. Falstaff's cry of 'You villain, there's lime in this sack!' must have been an echo from the very earliest days that fermented grape juice was sent abroad, and no trade has ever been entirely free of rogues.

The introduction of the machine affected the direct sense of responsibility in several ways. The factory was inevitably a much larger unit than the workshop. It called, therefore, for considerable capital to build and equip it, administrative ability to organize it and a knowledge of finance and book-keeping to keep it running smoothly. The craftsman whose experience was quite adequate in charge of a small workshop was frequently unable to cope with the new situation, and the financier or administrator seldom had the feeling for quality which is bred in the bones of the craftsman. The production of goods became divorced from their sale to the user. Often they were sold in great quantity to a wholesaler, who supplied the retailer, who in turn supplied the user. This lack of personal contact inevitably led to a decline of responsibility and also made it much more difficult to discover actual needs. The machine made it essential to split up a great number of operations so that instead of a skilled man making the complete article a less skilled man made one part only. Again the sense of responsibility was weakened. This has become much more apparent under conditions of mass production, where in order to equalize the timing of a sequence of operations a man may do no more than secure a few bolts. This question of responsibility for the finished job on the part of everyone concerned in the making of it is one of the most severe headaches industry faces to-day, where it often appears to the ordinary man, and even more to the ordinary woman, that neither manu-

facturers nor trade unions regard the convenience of the consumer as being of any importance.

So rapid have been changes in production over the past century that it is perhaps not remarkable that the rôle of the designer has had far too little attention. The production of immense quantities often became an end in itself: whether the individual article was really worth producing at all was not considered. Think for a moment of the potter in the middle of the eighteenth century. He belonged to a craft which for thousands of years had evolved a technique of making shapes which were both practical and beautiful. He was not a designer in the ordinary sense at all: he would no doubt have been astonished to be so labelled. Yet he was an artist of a humble kind working in a slowly-evolving tradition which he and his customers respected, even if only subconsciously. He had no drawings to work from: indeed there were no written details of any kind. It was Josiah Wedgwood, an early and active member of this Society, who saw that if pottery were ever to become freely available to all an entirely new approach was necessary. The body and the glaze would have to be standardized so that they could be repeated. The same applied to shapes: by publishing a book of patterns it would become possible to repeat exactly a tea or dinner set supplied some years before, even in far away America. This was a revolution indeed. And Josiah Wedgwood's active support in the building of canals shows that he realized that smooth and efficient transport was certain to become the very life blood of the pottery industry. He saw that the old craft system breaks down when confronted with the machine. Yet to-day there is an extremely lively group of studio potters in England, making splendid pots which cannot be factory produced, which seems to indicate that there is ample room for both kinds of production.

You cannot subdivide operations unless you have a complete series of detailed working drawings before a start is made. This means that the co-ordinator must be capable of visualizing every one of a whole series of operations performed by highly complicated machines. Is it any wonder that the engineer, who was responsible for doing this and who as a rule had had no aesthetic training, should have paid little heed to the beauty or even the convenience of the finished product? The wonder is that he did so well and when working on entirely new shapes, such as locomotives or suspension bridges, evolved forms which give great pleasure to us to look at to-day. Man's passionate interest in getting away from wherever he may be has resulted in a pretty high standard of design in almost all forms of transport, at least until the advent of the American motor car. But then this is styled by aggressive salesmen with every kind of help—except the vital one of a sensitive person who notices shapes—which only goes to show how important an educated salesman could be!

To encourage the manufacturer to produce better-designed goods is not enough. In the first place he cannot do this unless well-trained industrial designers are available and he knows how to get them to give of their best. This means not only offering them reasonable status and salary but responsibility comparable with that given to other experts in the manufacturer's team. Difficult as this

may sound, it is only the beginning of his problem, for unless he can find a way to get the resulting goods on to the retailer's floor he will not sell many of them, unless, of course, he is prepared to advertise them nationally or, as in the case of capital goods, he can sell them without the aid of a retailer. Nor is it sufficient for the retailer to put them on the floor of his shop—he must ensure that his sales staff are fully briefed about them and that they are arranged in their right context, i.e., that say a well-designed sideboard is not placed on a horrible carpet. This sounds elementary, but quite often it is not done. Design, like peace, is indivisible. You cannot produce first-rate designs for the goods you make by themselves. They need well-designed catalogues and advertising, good showrooms and factories. And if you feel that good printing is necessary for customers but your own staff won't notice internal printing, you are still off the beam. Either you believe in it or not. If you are making better designed things *purely* to increase sales you won't achieve the best. In a civilized country the production of soundly made, well designed things for ordinary people will become a social duty. It is as simple and as difficult as that. But the lesson has still to be learned.

In the succeeding paper I propose to examine the methods which have been used by the Council of Industrial Design in order to cope with this problem and the effect they have had on a number of different trades.

DISCUSSION

THE CHAIRMAN: While you think out your questions I will ask one myself. Early in his talk Sir Gordon mentioned the Stourbridge Glass Industry, and later he referred to the possibility and the necessity for co-existence of craftsmen and the factory production system. It happens that I was recently asked to design a set of glassware of the type made at Stourbridge. My clients gave instructions on the assumption (which I accepted) that it would be possible to have prototypes of the shapes blown by one of the best known firms nominated by my clients. Very recently the drawings went down, and back came the reply, 'We regret we are no longer able to make prototypes by hand'. Well, that really is a thumping facer, because there is a small industry which is only just one remove from the hand craft and even so they have thrown away the means of seeing whether a design is a good design or not before they put it into production—there really is no alternative, with glass, if you wish to make quite sure that your designs are good ones, but to see that design in glass. Does that not strike you, Sir Gordon, as being extraordinary and a regrettable state of affairs, or are you much too familiar with it?

THE LECTURER: I think the glass trade has suffered a great deal from the fact that, unlike pottery, it is a very difficult matter to make glass by hand. The kiln must be kept hot right round the twenty-four hours, and that cannot be done in a small workshop in the ordinary way. It is a task which needs to be worked by a shift. Certainly in one or two cases I know—in the big pottery works in Helsinki, for example—they have one floor where independent craft workers are allowed to use the facilities of the factory and produce what they like, which seems to me to be an admirable plan which might well be followed by other industries. It is very unfortunate if any industry gets itself into the position where it can no longer make small-scale experiments, because I think anyone who has had to design anything will agree with the Chairman that you must see the thing in the round; it is no good just looking at drawings, you have got to see a finished article before you start producing in a large way. I do not know what the answer is, but certainly in England in the

seventeenth century there were something like 80 glasshouses up and down the country in places where wood was obtainable for firing and they must have been run by small groups of people who at that time, of course, worked very long hours—possibly two twelve-hour shifts or something of that sort. I do not know what the answer to this is going to be, but it is certainly a very serious situation.

MR. G. VIVIAN DAVIES: Are we to assume that in a few years we will have no craftsmen left? We do seem to be heading that way. Are we going to be controlled, even in the engineering field, by an age where no one will be able to do anything for himself? I will give you a striking example. I went over a big firm recently, and in the boiler-house was a beautiful automatic plant, fully controlled, where the men only sit down and watch a lot of instruments. To my astonishment I found they were actually working this plant by hand, and I said to the managing director, 'Why is this happening?' 'Ah', he said, 'We have learnt our lesson. Something went wrong with the automatic equipment a little time ago, and there was nobody in the place who knew how to put it right. So now one day every week that automatic equipment is put out of action and the plant is run by hand, so that the men do not forget how to do it.'

Most of the beautiful buildings in London are being pulled down and frightful egg crates are going up in their place. The materials used on the outsides of some of these new buildings will, I am convinced, not last more than ten years at the most. There is a building not far from where I live, just off Baker Street, where the concrete facing is showing signs of cracking and discolouration. I dread to think what the outsides of such buildings are going to look like in another ten years.

THE CHAIRMAN: I personally am not so worried about that fault. It is undoubtedly a mistake that architects made, but it was one made much more often before the war, when the satisfying look of the new white reinforced concrete in a good photograph rather ran away with architects' enthusiasm; they tended to ignore what it would look like in ten years' time when the cement rendering had crazed. No doubt you can point to many unsatisfactory examples, but I should have thought architects would agree that that lesson in fact has been learned, and I do not think there should be much more of that particular trouble.

MR. DAVIES: The building I am referring to has only been finished a matter of two years. The extraordinary thing is that the owners for whom it was designed, having accepted a contemporary design of this sort, then fill the building with antique furniture and other relics of the past.

THE LECTURER: Mr. Chairman, I am personally very encouraged to think that a lot of these buildings which we see going up in London won't last more than ten years. I think there are a few good buildings, but the majority of them have the solitary advantage that they will not perhaps make quite so much dust as the older ones when they are pulled down!

MR. A. POWIS BALE: I am another engineer, and should like to express an opinion different from Mr. Davies. I think the whole theme of design should be put into three divisions: first, design from the point of view of construction and utility. Second, maintenance; and third, appearance. If designers would bear those things in mind I think they would meet the demands of people who put efficiency first of all, but you can incorporate them all together.

MRS. M. WALKER: I saw a piece of furniture in a friend's house which was quite beautiful, but I could not recognize what it was for. I asked, 'Is it a radio set?' I was told it was a sideboard. Does the lecturer think this is a good thing?

THE LECTURER: No, I do not. I think there is everything to be said for knowing what something is for by looking at it.

A previous speaker hit me very hard in talking about a plant and the difficulty

of knowing what it was for, because, having put an oil-heating plant in my own house, I know that if there was a breakdown I should have to go and get logs and put them on the fire!

MR. FRANCESCO GNECCHI-RUSCONE: For good design I wonder how much we can rely on the craftsman nowadays? I think the original conditions under which craftsman used to work have altered entirely, and good design now seems to be largely a matter of information and education, and therefore rather outside the reach of the ordinary craftsman. I come from Italy, where good design is now produced much more by industry than by craftsmen, and I wonder how much use you think craftsmanship is to good design?

THE LECTURER: On the whole very few designers in industry have been actual craftsmen running a shop; but it is very useful for a designer to be able to use his hands in some way or other. I think very often he gets a feeling for material which he cannot get in any other way. Certain designs have a brittle quality about them which suggests that the man did not really know what his material could do, and I think that is the main interest from the craftsman's point of view. But to train entirely in a hand shop and then go over to industry is not likely to give us the people we need to-day.

MR. W. S. BAGDATOPOULOS: Why is England as slow to-day as when I left it more than thirty years ago? If there are nine points in favour of a new invention and one against, people will only see the one against. Sir Gordon referred several times to America. Much reference is made to American achievement, and more often than not it is badly copied. We should take an independent outlook and possibly lead in practical improvements.

America is made by devils large and small who invade its shores from time to time, such as myself (I dare not say 'ourselves' for fear of offending). To give an example, we had the first Hotpoint dishwasher installed, which was not at that time entirely automatic: one had to flip over a lever, to bring about the changes of wash and rinse, etc.

Talking through my hat, I suggested that it should have been fully automatic. This had effect. In about a week four engineers came to Los Angeles from New York, and asked me how I would do it. My reply was, that it had been done in 1600, maybe 1500 or even in 1200—keeping them in suspense. I then suggested a disk at the top to receive cams for the changing of actions—in short, the striking action of a clock. Within a month we had one!

MR. S. C. NORRINGTON: As recently as yesterday afternoon I went over a big factory where one of the incentives to the workmen was the offer of prizes up to £250 for ideas. I should think I saw two or three dozen of these notices in various parts of the factory.

THE CHAIRMAN: I must confess that my attention has been slightly distracted occasionally by a picture up there by James Barry which seems to show possibly Apollo when he drank some fermented grapejuice with lime in it! It puts me in mind of the Delphic oracle, because hearing Sir Gordon on this subject is the equivalent of going to consult the Delphic oracle, but with some important differences which on the whole are to our advantage. One is that Sir Gordon comes here to talk to us, a labour which the priestess of Delphi would not have thought of undertaking for a moment; another is that I do not think he was propitiated with any sort of sacrifices first; and most important of all is that he has spoken with absolute clarity, whereas the priestess of Delphi used to make such extraordinarily involved pronouncements that there was need for a priest to turn them into riddles afterwards!

Which reminds me (and I must now confess I looked up this subject in Dr. Smith's classical dictionary) that it is really astonishing for what a long period the world has

been going down—and this may be some comfort even to you, Sir Gordon: Dr. Smith says that in the early days of the consultation of that oracle, the priest who translated the nonsense into riddles used to deliver the riddle in the form of hexameters, but later on, he says, those who consulted had to be content with prose.

Following a precedent not quite so ancient as that, but going back at least as far as our own King Henry IV, Sir Gordon is presented on this occasion in two parts, and I have been asked to remind you that the second part is to take place at the same time on Wednesday, 23rd March. This is not inapposite, because in the last two lines of *King Henry IV*, Part I, the King himself concludes, 'And since this business so fair is done, Let us not leave until all our own be won'—and that I thought was such an apt comment on Sir Gordon's wonderful tenacity in the pursuit of this subject that I could hardly do better for my small part this afternoon than to leave those two lines ringing in your ears. But, of course, it is your intention to leave Sir Gordon's ears ringing with the usual sound of your gratitude, given with more than usual emphasis.

The vote of thanks to the Lecturer was carried with acclamation, and the meeting then ended.

MODERN TRENDS IN INDUSTRIAL DESIGN

The second of two papers by

SIR GORDON RUSSELL, C.B.E., M.C., R.D.I.,

lately Director, Council of Industrial Design, read to the Society on Wednesday, 23rd March, 1960, with Oswald P. Milne, F.R.I.B.A., J.P., Chairman of Council of the Society, in the Chair

THE CHAIRMAN: Sir Gordon Russell has been a friend of this Society for a very long time, and has done it many services. As you know, though he has just retired from the Directorship of the Council of Industrial Design, he has become President of the Design and Industries Association. Sir Gordon has shown undoubted leadership in all matters pertaining to industrial design and to craftsmanship, and he is, as well, a distinguished designer in his own right; he has gained many honours in connection with his furniture. He comes from a family which has been associated with the furniture industry for a number of years and he was brought up in that delectable Cotswold country in Gloucestershire, where he was familiar with the lovely buildings and lovely stone of that neighbourhood, and with furniture made of the fine timber that grows there. One of his earliest sensations would be that delightful smell of new-cut timber from the saw or from the plane, and I am sure his earliest recollections would be of the lovely finish and grain of wood. But Sir Gordon has another gift as well. Many a born artist is not well able to express himself in words, but Sir Gordon we also know as a teacher and a prophet in anything to do with craftsmanship and design.

The following paper, which was illustrated with lantern slides, was then read.

THE PAPER

In my previous paper I attempted to trace the development of industrial design as a profession, to indicate certain reasons for its somewhat tardy development and to sketch briefly the difficulties which must be overcome if it is ever to attain its full stature. To-day, I propose to try to assess what progress has been made since the war in a representative group of trades. For this purpose, I am fortunate in having the reports of the various Working Parties set up in 1945–6 by that far-sighted man, Sir Stafford Cripps, then President of the Board of Trade. These provide an interesting picture of a number of British trades presented, on the whole, with remarkable detachment and penetration, bearing in mind that the Parties were mainly composed of members of the trades concerned.

Several Working Parties asked the newly-formed Council of Industrial Design to report to them. The proposal, which constantly recurs, of setting up a Design Centre for an industry was one on which the Council had second thoughts when it realized how handicapped such a body would be, in a provincial town, under

the auspices of a Development Council maintained against the wishes of the trade. Even in London, this situation led to the virtual abandonment of the Design and Research Centre for the Gold, Silver and Jewellery Industries, and also of that for the Rayon industry, in anything like their original form. But against this it is most encouraging to reflect that the very first Design Centre of all, that for the Cotton industry, set up in 1940 in Manchester on the basis of a levy on raw cotton, has done a remarkable job of work for the trade and is flourishing to-day. The Council felt that a Design Centre in London for a considerable group of trades, which would be of public interest, was an essential preliminary.

The Council also felt strongly that the job of improving design standards in industry would not be practicable in Britain by using any form of control or dictation. To build up friendly relations with trade associations and individual manufacturers and to make every endeavour to offer a service of real value have been matters of cardinal importance in its programme. Industry's attitude to the Council in its early days varied from downright hostility to complete apathy, usually with a tiny group of enthusiastic supporters, so it was obvious that the operation could not be hurried. But the sincerity of the Council's approach and the soundness of its judgement, which has been of considerable use to far-seeing manufacturers in many trades, have now altered the situation considerably, as will be seen in looking at furniture, the biggest single item in furnishing, which I therefore take first in my survey of design progress.

FURNITURE

As the Furniture Working Party report is, I believe, the only one to include a very full report on design—submitted by a committee specially set up for this purpose, of which I was a member—I make no apology for quoting it in some detail. What the committee reported on furniture was broadly true of most other trades.

The report, made in 1946, states:

> We have been impressed by the lack of enterprise in some sections of the furniture industry during the last decade. An outward and visible manifestation of this lack of enterprise is clearly seen if we turn to design. In the 17th and 18th centuries there was little doubt that this country led the world in the design of domestic furniture, but no one would suggest that during the last twenty or thirty years we still had this leadership.
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> In the furniture industry design is so important that we have spent a considerable time investigating the position closely. In many industries, for example in the manufacture of aeroplanes, locomotives and many other technical products, it is the functional aspect of design which is of fundamental importance, and though a certain beauty is often achieved, it is almost incidental. But in furniture the problem of design is not purely functional; furniture has to be lived with at close quarters and not only must it give efficient service, but it must also give pleasure. In our opinion, therefore, it is proper that this subject should occupy one of the most important parts of our report.
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> We started by assuming that it would be generally accepted that there is such a thing as a standard of good design; that the industry has a responsibility

to supply furniture of good quality, including quality of design; and that there is at present great scope for improvement. But our discussions have shown that this assumption is by no means common ground in the industry and that some firms would in fact strongly oppose it. We feel, therefore, that before proceeding to a detailed consideration of the problem of design we should state clearly the assumptions on which we have based our approach to it.

The idea that good design must satisfy a number of well-defined conditions has long been accepted by those who have made a study of it, but this idea is still so generally unfamiliar that we feel justified in outlining its necessary conditions. We believe that good industrial design is concerned with form, colour, decoration, texture, fitness for its job, method of production, method of transport and saleability. It is not something applied at the end nor is it something different for the sake of being different. Conscious design must start at the inception of the article and go on steadily till the end. It is in the early stages that the basic shapes and many details are fluid. An opportunity missed then will not recur, and it is only the trained and imaginative industrial designer, who is likely to be aware of such opportunity. Good industrial design under present-day conditions is the work of a group of technicians of whom the leader is the industrial designer. If properly trained he is the obvious person to express an opinion on function, form, colour, texture, finish, etc. He must work in the closest collaboration with the mill-manager, sales manager and others. When a technically-minded artist has been stimulated by a problem he and his team will be likely to get the best attainable results out of the complicated industrial processes of to-day and the available materials, adapted to the ends which the object has to serve. For this reason it will be seen that good industrial design must of necessity be in tune with its own age. The copying of the forms of a past age which were designed for totally different conditions, materials and methods of production will get nowhere, whereas a knowledge of the past used as an inspiration for the future may be of real value. It is true to say that our heritage of furniture in this country is so fine that, if once we could find our way to the right road again, we might well become world leaders once more. We must learn again to think of design as an essential element of quality, as important as materials and workmanship.

It is essential that a well-designed object should not only do its job with the maximum efficiency; it should also give visual pleasure. People however have widely different views on what gives them visual pleasure. To know what one likes is not necessarily to know what is good and what will stand the test of time. Just as writing is complementary to reading, without which it would serve no use, so industrial design needs its public. And *good* industrial design needs a *critical and appreciative* public.

Any improvement in industrial design will increase the size of this public, already greater than many manufacturers and retailers believe, by making well-designed things more familiar to the mass of people. The interest aroused by excellent Service exhibitions, by cheap and good books, and by music should be borne in mind in this connection.

We must emphasize that whether industrial design is deemed good, bad or indifferent is not merely a matter of opinion. It is a matter on which all those who have a trained aesthetic sensibility the world over will agree, in broad principle. To say that they have no right to do this and that they speak with no more authority than, say, a vagrant brought up in one of our great industrial towns is nonsense—such a man, it is likely, has never considered the problem and has hardly a single thing of beauty about him. It would be as reasonable to say that a man trained as an accountant is no more fit to air his views on

book-keeping than an engine-driver. We accept the view that a very large proportion of the furniture made in this country before the war was of poor design and we cannot say too strongly that we feel that the inhabitants of our industrial towns should not be fobbed off with ugly things because they live in squalid surroundings, and because for the moment many will accept such things as natural. An increasing number is aware that something is missing in their lives and the furniture trade would acquire immense prestige if it accepted the responsibility of becoming leader of the more forward-minded. Moreover, such an attitude is essential in export trade where competition, although much more severe than at home, is easier to deal with on a quality basis than a strictly price basis.

Pioneering requires courage but history is one long record of progress made in the teeth of opposition and of developments which were rejected by one generation and accepted as a matter of course a few generations later, and we see no reason why the forces of reaction should not be overcome in cultural as in technical matters. We do not believe that the public's taste can be properly assessed as long as the choice available to them is between one poor design and another, for until good design is as freely available as bad they have no real choice in the matter. In spite of its limitations of choice we believe that the utility furniture scheme has done much to accustom a wider public to a better standard of design.

We take the view that in normal conditions the designer should be given the maximum freedom to express himself and that the public should have a wide choice of good quality articles.

In considering the whole problem of design in the furniture industry, therefore, we have been governed by these two overriding considerations—that there is a standard by which design can be judged and that the fact that we are not all trained in design is no excuse for a static or retrograde design policy.

The Furniture Development Council is one of the few which has not only survived its teething troubles but has done much valuable work for the trade, which is now beginning to be recognized. The Kite Mark scheme of B.S.I. has also led to a good deal of cleaning up of the lower end of the trade, and the Forest Products Research Laboratory of D.S.I.R. has put a great deal of accurate information in the hands of those furniture designers who have taken the trouble to make use of it.

At the end of the war responsible firms in the trade, stirred by the Working Party report, were determined to do their utmost to prevent a recurrence of conditions which were unsatisfactory to manufacturer, retailer and customer alike. Conferences of manufacturers, and especially courses for retail sales staff, of which some fifteen have been run by the Council of Industrial Design since 1948, have proved so useful to the trade that they are now sponsored jointly by the National Association of Retail Furnishers and the Council at the request of the former. Several years ago, following strong criticism in the Press, the British Furniture Manufacturers' Federated Associations decided to see what could be done to improve the standard of their annual exhibition at Earls Court. They appointed a well-known consultant, Professor Misha Black, to design the exhibition as a whole and, with great courage, they put up a suggestion to the Council of Industrial Design that they would give central space in the exhibition if the Council would select about fifty of the best-designed things in the show.

This was done and proved so successful that the organizers have continued each year to give free space for some form of selective display, and it has had a remarkable effect on the general standard. The furniture exhibition is now one of the best trade shows in this or any other country. This enlightened new approach has not only raised the prestige of furniture in the eyes of the public but has proved an inspiring example to other trades.

There is, of course, still a lot of bad furniture about, but the proportion of good has greatly increased. In too many cases flashy 'modernistic' designs are being accepted as good examples of modern design, and the hire purchase chains could do much to prevent this by offering the public more of the better furniture now being made.

The trade is among the biggest groups of subscribers to the Council's magazine *Design*, it has consistently used the services of the Record of Designers and is taking the much more highly trained students from the Furniture School of the Royal College of Art and other schools at far better pay than was usual before the war.

I have dealt at some length with this trade because I feel it has become a pacesetter with small risk of a serious relapse, and it is a trade I know better than most.

RADIO AND TELEVISION

Starting from the lowest design standards of the furniture trade before the war, the best radio cabinets forged ahead of mass-produced furniture, but since then the trade has lost its impetus—now it has become a camp follower tagging along in the rear. This is a great pity, because it is exporting a considerable proportion of its production. To make design progress any trade must have at least a few people who care about design but, as in a number of other trades, this essential factor appears to be absent. There have been isolated attempts to improve the standard, one of which won a Design Centre Award in 1958. The last radio exhibition was indeed a warning, without form, content or serenity yet full of the most ingenious products.

CARPETS AND OTHER FLOOR COVERINGS

Unlike the furniture trade, the carpet trade has for a long time employed a high proportion of designers, but most of them entered the industry at an early age and had little opportunity to travel or to find out what was happening in architecture or interior design at a time of rapid change. Again, unlike the furniture trade, a considerable proportion of the carpet trade's products have always been made for export. Naturally highly skilled firms preferred to sell intricate patterns presenting difficult production problems rather than simpler body carpets which met with early local competition. Copies of oriental carpets filled this bill and have tended to become a staff designer's obsession, whereas architects designing modern interiors call for much simpler patterns of to-day.

The trade as a whole took the Working Party report seriously and has done a great deal to meet changing conditions. The Council of Industrial Design

has been asked to stage several conferences for carpet designers. It is the only trade which has invited the Council to arrange a foreign tour for designers and, more remarkable still, asked for them to be shown both new and old examples of good architecture and decoration rather than carpets, as being far more stimulating.

Carpets, like textiles and wallpaper, are filed in Design Index, the Council's illustrated record of well-designed goods, as samples, not photographs. Manufacturers are keen to be represented in The Design Centre and it is now possible to see an interesting range of good modern designs. The conservative attitude of many retail buyers is a stumbling block at the moment, but this is not peculiar to carpets. However, the carpet industry is a good example of the necessity for simultaneous design progress, i.e., a progressive approach by industry and willingness to support manufacturing enterprise in the retail store.

The linoleum trade, which at one time spent far too much energy in imitating marble, tiles and other older flooring materials, is now beginning to see that linoleum is a good product in its own right and can be designed accordingly.

TEXTILES

The textile industries, especially cotton, have suffered great depression for long periods during the past twenty or thirty years. Adversity is quite often a spur to design progress and, particularly in the case of a number of firms in the clothing and furnishing sections, there is to-day a high standard of design. On the other hand, a walk through most furnishing stores will quickly disclose that this cream of production lies thinly on top of a vast output of mediocre and thoroughly bad design: women's dress fabrics have made a great advance and men's are usually good if somewhat stereotyped.

The Council of Industrial Design is soon to organize a textile design course for retail furnishers at the suggestion of the Furnishing Fabric Manufacturers' Association. There is clearly much scope for better retail appreciation of good design in furnishing textiles. There is evidence that the public is often ahead of the retail buyer.

Some of the new man-made fibres have made a real effort to set a better design standard, which naturally has repercussions on the older groups.

PLASTIC SHEET MATERIALS

Sheet materials, particularly plastic coated fabrics and laminated plastics, have in recent years been produced with much more thought for design, and colours have been greatly improved. The manufacturers of leathercloth are no longer content to regard their product merely as an imitative one, and it has been encouraging to note that new uses have developed as more imaginative design and colour ideas have been worked out.

The production of laminated plastics rests with only a few companies, several of which have a progressive attitude to design, which has enabled them to extend the market for the material.

WALLPAPER

The vogue for bare walls among the *avant garde* in the 1930s and wartime scarcity of paper led to a great improvement in wallpaper design as soon as the basic raw material became available after the war. At all price ranges it is now possible to get pleasant papers, which was not the case before 1939. There is, too, a reaction to the stark phase of modern decoration which, of course, did not penetrate much below the advance guard crust, but this was enough to administer shock treatment. Some experiments are taking place in embossed wallpapers, which certainly have not a very alluring design record.

POTTERY

Like carpets, pottery is an important export trade and has been ever since the eighteenth-century potters turned it into a scientific industry. Their success was indeed so spectacular that to a large extent the industry has been living on it ever since. The replacement of breakages raises an acute problem for pottery manufacturers and designers and leads naturally to a tendency to maintain shapes and replace the decoration on them. Indeed, some of the shapes of such things as plates, teapots and teacups are so good that they could hardly be bettered, and a few of them have in fact been in continuous production for two hundred years. This surely is a searching test. But when old patterns have been hashed and re-hashed for years, imagination is stifled, and there is little sense of direction when attempting to break new ground. For this reason the so-called 'contemporary' pottery, glass, carpets, linoleum, moquettes and furniture of the 1930s must surely rank amongst the most frightful objects ever produced in time of peace by a country calling itself civilized.

Since then a considerable advance has been made and a few of the new shapes put out by famous old firms can bear comparison with their eighteenth-century achievements, which is saying a great deal. The industry as a whole owes much to North America for putting it on its feet after the war. Inevitably this has affected thinking in Stoke, particularly as the fine china manufacturers were shut out of the home market, so valuable for experiments, by the ban on decorated china which lasted for fifteen years. To-day, therefore, it is a somewhat fickle market in the United States which tends to dictate design, whereas in the eighteenth-century English china was influenced by the highly developed, centuries-old Chinese porcelain industry, on an imperfect view of which it evolved a distinct English style. Perhaps it will succeed in distilling a similarly rewarding essence. If so, it will be in spite of a disintegrated cultural background.

Courses for retailers at Stoke-on-Trent, sponsored jointly by the British Pottery Manufacturers Federation and the Council of Industrial Design, in which manufacturers have taken a great interest, have done much to focus attention on design problems, and to underline the point that any advance must be a joint effort.

TABLE GLASS

Like pottery, English table glass achieved a great reputation in the eighteenth

century and also suffered grievously from the long ban on decoration in the home market imposed during the war and for several years after. In the past it made no attempt to copy the over-elaborate forms of Venetian glass which had been imported in considerable quantities. Typically, the English makers evolved their own tough, heavy, durable lead glass, far less ductile than the Venetian but far more practical for everyday use. From the middle of the eighteenth-century onwards a tradition of cutting was perfected which displayed the brilliance of the metal admirably. This surely could have been developed still further if there had been sufficient imagination in the industry. But the fact that it is basically a handcraft industry with a great tradition in a machine-mad world seems to have had a depressing influence instead of acting as a spur, as it should have done if sights had been set higher. The improvement in the design and manufacture of machine-made table ware, at a time when the cost of hand-blown glass has greatly increased, seems to indicate that competition on first rate quality and especially on design rather than on price, is at least worth a more thorough trial. This should encourage the cutter or engraver—through them new British glass could become famous again as it was in the eighteenth century. Interesting small-scale experiments in glass decoration have been made by Laurence Whistler and Harold Gordon. There is no doubt that both the glass and pottery trade would benefit greatly by a closer association with such independent craftsmen, who are unable to make their own shapes in glass because a pot of molten glass, once heated, must not cool. In pottery, on the other hand, there is a very lively group of workers, which could prove as stimulating in Stoke as a similar group has in a well known Finnish pottery.

LIGHTING FITTINGS

Whereas in the pottery industry a great many of the products such as table-ware, flower vases, etc., are still used in much the same way, lighting has had to survive two metamorphoses, from candles to gas and from gas to electricity. The piping of an explosive gas into houses made the siting and fitting much more permanent than it had been hitherto. It is not unnatural, therefore ,that in each change there has been a substantial carry-over, and the more decorative the fitting the more marked this has been. It can be said that to-day a very real attempt has been made to solve the problem of interior lighting from a purely utilitarian point of view. That the wrong type of fitting is often selected is undoubtedly true, but this is not altogether in the control of the industry, although closer association with architects might do much to correct this, especially in large office blocks. When a decorative fitting is required the position is not so clear, and the great beauty of the old candelabra of brass or glass seems to have inhibited new thought on the part of designers.

HEATING APPLIANCES, COOKERS, ETC.

The great increase in the price of coal since the war has stimulated experiment in the design of stoves with a view to increasing their efficiency, which in many

cases had been as low as their design standards. There has been an improvement, too, in finish, although the porcelain enamel frequently has an oily look and it does not seem easy to devise a trouble-free finish which has the beauty of blackleaded iron.

On the whole, gas stoves have shown a higher design standard than electric ones, particularly in such important details as handles, taps, etc. Both trades at the moment seem to be flirting with rather flashy styling which frequently makes cleaning more difficult and sometimes even lowers the efficiency of the product more radically. British industry as a whole will need to beware of this trap, so specious to the gullible. Taking a leaf out of the American book, I have invented a word for it: I call it 'stupidization'! It is a serious and infectious disease.

HARDWARE

In all home appliances an immense amount of ingenuity has been expended. Where this has been directed to improving the product it has been of considerable value, but where it has been blatant styling, backed by national advertising, the advance has been backwards. On the whole, the hardware trade has approached the subject of design in a commonsense way and many kitchen appliances, for instance, have been greatly improved. The addition of a name in thoroughly bad lettering or a trade-mark which originally cost thirty shillings and is said to be worth half a million to-day, is hardly likely to improve the appearance of the article.

PLASTIC WARE

Before the last war plastic materials were used mainly in the electrical and radio industries and in the production of such things as ash trays, saucepan handles, etc. The G.P.O. telephone was probably the best known example.

Two of the cheapest of the new post-war plastics, P.V.C. and polystyrene, proved so versatile that many manufacturers seized upon them as substitutes for steel, from which domestic products had hitherto been manufactured, with the curious result that the designs of these products remained the same, even though the material and the manufacturing process were completely altered. It was discovered all too late that frequently the materials which had been used and the designs which had been copied were far from suitable, to the great harm of the trade as a whole.

Since then the industry has done much to rehabilitate itself. The position to-day is indicative of the recovery which has been made. At the last two Plastics Exhibitions the Council of Industrial Design was involved in selecting a display of well designed British plastics products, an impossible task ten years ago. In 1958 two of the Design Centre Awards were given to products made almost entirely from plastics. It is also significant that competitions in which cash prizes are being given for good designs in plastic are being organized by the large raw material producers. As in other trades, there is still an immense amount turned out with very little consideration of design, but at least a useful start has been made.

CUTLERY

This is an industry of small family firms and little masters and suffers from the advantages and disadvantages of such a set-up. Curiously enough, the invention of stainless steel, with which Sheffield had much to do, did not stir a design ripple in that city. The material itself was not exploited—the aim seemed to be to make it unrecognizable in the hope it would be taken for nickel or even chromium! It was left to other centres with far less knowledge of steel to exploit new shapes and finishes which the new material made possible and which have proved eminently suitable under the new conditions of to-day. Several firms are making valiant efforts to catch up, but the initiative is not easy to recover.

It would not be difficult to quote other instances in British industry where the difficulties created by new materials or techniques have been stressed most volubly and the opportunities ignored.

GOLD, SILVER AND JEWELLERY

Perhaps no trade has been so disrupted by purchase tax as this one. It is a trade with a highly-skilled, specialist side and a cheap, mass-production side. The former is essential to give some kind of stability and sense of direction to the latter, which has little of its own. Yet purchase tax, by discouraging the making of fine individual pieces of silver, had induced an air of pessimism in the trade which, coming at a time of full employment in other industries, has all but stopped the flow of apprentices. The relief of purchase tax scheme for individual pieces of fine design has alleviated the hardship a little, but its scope is limited. The splendid tradition of English silverwork, which the Goldsmiths' Company has done much to foster over the past thirty years, might blossom again if it were given a sporting chance.

The mass-produced costume jewellery section of the trade might well take a lesson from the ready-to-wear women's dress trade which, from a design point of view, has made a great advance over the past generation. Its close connection with the highly prosperous souvenir trade, which is quite unaffected by any glimmering of a design consciousness, makes any advance both uncertain and difficult.

CLOCKS

The development of clocks in England is a fascinating story, and as examples of domestic machinery many of the seventeenth- and eighteenth-century examples are indeed hard to beat. Since then, owing to broadcasting and the development of the cheap wrist-watch, the domestic clock has come to be regarded as an ornament rather than as a time-piece, with disastrous results to its appearance. In attempting to drag it back to consciousness, most designers have over-stressed its functional side by simplification to the point of starkness and harshness. The next stage is now eagerly awaited.

TOYS

Our scale model toys are excellent in this country, diminutive locomotives

and rolling stock, motor cars and so on made with meticulous care in detailing. Yet there is little sign of any discrimination in selecting the original because it is finely designed. The doll's house, for instance, will often be a reproduction of the average house on a by-pass road—By-Pass Tudor—or if this is felt to be a bit out-of-date then it will be some speculative builder's idea of a modern house, with all its wearying clichés. The idea of employing a first-rate qualified architect to design the house would appear as revolutionary to the toyman as to the Building Society. So the world in which children live is reflected in little, which I suppose is not unreasonable—perhaps it gives the child some feeling of security—but doesn't make for any kind of advance! However, this point of view is deeply underlined when it comes to the more imaginative type of toy. Here, it seems, manufacturers are prepared to follow in the footsteps of the foreigner, although there is no doubt that skilled designers could bring about as great an improvement in this as they have already done in other sections of industry.

SPORTS GOODS

But when we look at sports goods, the situation is very different. Tennis rackets, cricket equipment, skis, footballs and hosts of other such items have been refined in design by a process of elimination which has gone on steadily for many years, sustained by great popular enthusiasm. Like the sportsmen who use them, they have a clean workmanlike look which anyone can understand and appreciate.

HAND TOOLS

These generally have the same quality. The only way to uglify such things is to add some label with beastly lettering and perhaps pack them in a poorly-designed box. It must be said, in all humility, that most manufacturers take full advantage of this escape clause. Motorized tools of all sorts have developed very rapidly since the war, but few of them show evidence of a comprehensive approach to design.

LEATHER AND PLASTIC LUGGAGE

Air travel has had a great influence on the design of luggage, and weight is now an all-important factor. Because of this and price, the tendency is to use plastic and, more recently, pressed glass fibre as a material for luggage rather than leather, although one enterprising manufacturer, a Design Centre Award winner, makes an excellent range of leather suitcases which are lighter than some canvas and plastic ones.

HEAVY MACHINERY

Although one of the best-known of the Victorian locomotive engineers described himself proudly as an 'artist engineer', as he certainly was, there has, until recently, been little collaboration between engineers and industrial artists. However, this situation is now changing, mainly because of the very real need to-day to study the convenience of the machine operative. This stems in part from wartime investigations into causes of fatigue, but perhaps even more from the increased mobility of labour and the consequent ability

to choose one's job at a time of full employment; and, indeed, from the more enlightened outlook of manufacturers. There is still a strong tendency to design in terms of styling: good design is much more basic than that. The interest to-day in engineering for its own sake and not because of its decorative possibilities should ensure a comparatively rapid design advance once it is seen as an integral part of engineering design and not as something superfluous—a bit of art—added at the end.

The Council of Industrial Design recently held its second conference for engineers. The first was concerned with machine tools; the second with textile machinery.

RAILWAY ROLLING STOCK AND OTHER EQUIPMENT

As a result of setting up a Design Panel by the British Transport Commission in 1956, the tendency to overlook the importance of the visual aspect has been arrested and action has been taken which should ensure a high standard of design in the future. I say 'in the future' advisedly, for in such a large and complex organization it is necessary to consult many different groups. The railway engineer who was the blue-eyed boy of the nineteenth century has had to make many stultifying readjustments in an age which thinks in terms of motor cars and aeroplanes. It is not only more comfortable but much safer to go long distances by rail rather than by road. For this reason, I am one of those who believe that there is still an important job to be done by re-equipped, well-designed railways and that a sense of pride, at one time so strongly marked, would be re-created. Indeed, the value of good design in giving pride in workmanship is greatly underrated in British industry.

MOTOR CARS

The British motor car at its best took over many of the finer qualities of the British locomotive—clean, neat lines, no fuss or exhibitionism and excellent workmanship. But from the start the industry suffered from the lack of a design policy, on the part not only of the car manufacturers themselves but also of the many firms which make components—although, of course, immense drive has been put into technical development. The successful building up of a valuable export market, especially in the United States, naturally made manufacturers look at the highly-styled American product which, as few of them had any strong design feelings of their own, was bound to be of influence. But as, from a design point of view, the American car could hardly become worse, it would seem not unreasonable to argue that it might become better and that products which set a higher standard would then be at an advantage. But it was not until the Americans began to employ excellent Italian designers that British firms followed suit, when they might so well have built up equally famous design studios of their own, given even modest encouragement.

BICYCLES

Bicycles have such a long record of trial by enthusiasts that their general design record has been excellent—sheer weight precludes the addition of bits

and pieces. When it comes to decorating by transfers, the makers invariably display their lack of taste, which they assume is shared by their customers. But is it?

STREET FURNITURE

The great increase in street furniture of all kinds, mainly due to the impact of the motor car, has raised many design problems which are still a long way from being solved. These fall broadly under three heads:

1. Competent designing of lighting columns, bus shelters, litter and sand bins, telephone kiosks, parking meters, direction signs, street nameplates, park seats, and so on.
2. Co-ordination of the design of this wide range of products, mostly made by different manufacturers.
3. Competent selection of suitable designs for widely differing sites.

It is unfortunate that the war, by causing a grave scarcity of all metals, laid emphasis on concrete for lamp standards, and since the war the great increase in the cost of painting has led many local authorities to adopt it. For although some excellent concrete columns for main roads have now been designed, concrete is not a material which admits of elegant treatment in the small scale necessary for, say, an eighteenth-century street in an old town, where the repetition of portly columns can be most disconcerting. But as a rule this is a question of cost and therefore the leading question is: 'How many ratepayers consider a good background worth paying for?' At the request of the Ministry of Transport, prompted by the Royal Fine Art Commission, the Council of Industrial Design took over the approval of lighting columns for Grade 'A' roads and later was asked by the Ministry to accept similar responsibility for other street furniture. This has brought about some improvement, but the range of well designed articles is not yet adequate and it is disappointing to find that many local authorities still select the worst designs available.

PREFABRICATED BUILDINGS

Prefabricated buildings have become industrial products, yet very few of them have received any attention from an architect or industrial designer. It is a matter of great concern that the country should be littered with bungalows, factories, farm buildings of all kinds, greenhouses, garages, petrol stations, etc., which might well be neat, shipshape and seemly yet which, at their best, are usually undistinguished and, at their worst, downright hideous.

GRAPHIC DESIGN

Although not strictly embraced by the term 'industrial design', graphic design is so closely interlocked with it that I feel it should be mentioned. The general standard of packaging has improved: indeed it could hardly be otherwise, as wartime scarcities made packaging primitive in the extreme and much of it remains poor. Advertising layout is often excellent but posters, which enjoyed a renaissance in the 1930s, have gone into eclipse. The spur of television ought

to ensure that the small group of skilled poster designers is more fully employed so that posters might be looked on as an urban amenity instead of a disfigurement. Good commercial printing is not difficult to obtain, yet many firms pay little attention to their noteheadings, leaflets and catalogues. The Council of Industrial Design has sponsored two travelling exhibitions jointly with the Federation of Master Printers.

Whilst I have covered a wide range of industries I realize, of course, that it is by no means comprehensive.

What are the factors which have led to an improvement in standards? Wartime and post-war opportunities for young people to broaden their knowledge and experience; the increased interest in music, literature and the arts; authoritative articles on design in the Press, and the 'do-it-yourself' movement. Television and visual education in schools—and, of course, many of the new school buildings themselves—have encouraged people to look around. Generally there has been a great improvement in housing, especially local authority housing. Building societies could do more to extend this into the private enterprise section, and an important lead has recently been given in this direction by one of the home magazines.

The great advance in exhibition display has been another factor. Before the war, practically all popular exhibitions were chaotic jumbles of competing stands, furnished with objects which would certainly have been described as peculiar if they had not been so universal. During the war, a small group set up by the Central Office of Information staged some remarkable small exhibitions of ideas. Unlike the haphazard display of goods, a theme for these was essential. This brought coherence and demonstrated the immense potential value of pictorial display. It was obvious that the use of the new technique was not limited to war time. But, oddly enough, when so many of industry's products were really competently displayed they did not stand up to the challenge. In other words, they were not worthy of their setting. They needed to be much more competently designed to match the display. Even to-day, a great many manufacturers pay far less attention than they should to both the design of their goods and the way they are displayed and packaged. But this situation too is changing. It is clear that to pay a high price for space in an exhibition and then save on the designing and the workmanship of the goods, stand and display is hardly likely to yield the best results.

The Council of Industrial Design may justly claim to have had a share in improving standards of both display and the design of goods, especially since the opening of The Design Centre in Haymarket in 1956.

A great stimulus could be given by more enlightened buying on the part of Government Departments, Local Authorities and the Services, which are among the largest purchasers of durable consumer goods to-day. The Post Office has taken an interest in improving the design of the telephone and its kiosk, greetings telegrams, stamps and so on. Its buildings, designed by the Ministry of Works, are seemly if not distinguished and are certainly a good deal above the low standard of most of the multiple stores. The Services seem to regard ugliness as a major

weapon of war which, unless carefully nurtured, might die out in peacetime. Their anxiety is unnecessary. Even without their support, it will, I fear, be with us for a long, long time, but there are welcome signs that the tide may have turned.

DISCUSSION

MR. A. POWIS BALE: I should like to ask why the lecturer has not divided his argument into two major parts; that is, designing for function, and designing for appearance; because as an engineer there are certain things you cannot do. In fact, in some designs —particularly motor cars—where a man improves the looks, he has made maintenance more difficult, as many engineers know. In many other engineering designs, accessibility is sacrificed for a little extra smartness of appearance. Therefore I think that while designing furniture and certain houses is very essential, it should be kept quite apart from the design for functional purposes.

THE LECTURER: May I say that exactly the same problem arises when the *engineer* designs for appearance. Occasionally he does things like the tavern cars for British Railways, which I think are one of the most humiliating things to have happened since the war; and the only thing one can do there is to get some much closer integration of the engineer's interests in visual appearance. They are not two problems, they are all part of one problem, which have got to be somehow welded together.

MR. B. HARRINGTON, M.S.I.A.: Is there any liaison between the British Standards Institution and the Council of Industrial Design? It does not seem so, to judge by some of the products exhibited at the Design Centre. I know certainly of one product which received a 'Design of the Year' award and which is not recommended by the Building Centre.

THE LECTURER: I am no longer connected with the Council of Industrial Design, so I cannot be held responsible for this; but I would say that we built up very friendly relations with the British Standards Institution and did consult them on a great number of matters. I could not answer for the particular case you mention without having further details.

MR. F. A. TAYLOR: Sir Gordon has given these examples of opportunities in industrial design, but he did not say anything about the opportunities for employment for industrial designers. Whether he avoided the matter I do not know, but I should like to ask if he can give any lead as to possibilities of employment for industrial designers at the moment, because there are quite misleading statements made about it.

THE LECTURER: I am well aware that there are many gaps in the statement I made. As far as employment is concerned, I think the problem to-day is that industry is to a large extent becoming aware that this is really an important problem, and therefore there will follow great opportunities for employment for people who are highly trained and are willing to collaborate in the making of things (that is essential). But how many that will be it is difficult to say. I remember during the reorganization of the Royal College of Art we tried to assess what the various industries might be able to use in the way of designers. Industry itself cannot tell you. It depends very much on what the standard is. There is no doubt whatever that the employment of designers ought to be far higher in industry than it is to-day if we are going to get really good results, but I think the important thing is they should be really very well trained people.

MR. ALAN WELLINGS, A.R.C.A.: Someone said rather facetiously that the difference between antique and modern furniture is that the modern looks older more quickly. Perhaps this is because modern design depends so much on sheer line and plain surface, which even with the best care in the world will collect dents and damage,

whereas the Victorian designers put in decoration to camouflage the damage to some extent.

MR. RICHARD BARTLE: I am a designer. In relation to the advisory councils (including the Council of Industrial Design), are we aware of the difference between sponsoring design fashions—particular phases of design—and the encouragement of design research, the value of which may not be fashionable at the time, but is built on philosophical precepts, on analysis of developing social behaviour? In other words, there may be quite a few people who are future geniuses but whose work at the present moment does not comply with the fashion trend at all. In fact, there is much anachronism in design of the old type.

THE LECTURER: It seems to me that the more durable a thing is the less influential, on the whole, is the fashion element. If you are buying a thing to last twenty or thirty years then you do not want it to have a highly-styled fashion content; but if it is something which can be bought for a moment, then fashion is all important. Supposing a woman buys a hat; if she is a pretty woman she puts it on her head and looks wonderful, and she can buy almost anything, but you cannot make any sort of design theory out of that.

MR. BARTLE: I was thinking of what is loosely termed contemporary.

THE LECTURER: Well, contemporary is a terrible word really. It has become a style but it should include everything that is made to-day. There is much really bad 'contemporary' work about which will not last, but there is also a great deal being made to-day which will. The important thing is, if it is a really durable thing, that it should be something you would like to go and look at in ten or fifteen years time. After all, with most eighteenth-century furniture, you can go back and look at it with just as much pleasure as they took in it in the eighteenth century.

MR. J. LLOYD OWEN: I would like to follow on in the spirit of the last speaker but one. I should like to ask Sir Gordon if he would explain to us *precisely* why he thinks that this mathematical furniture, which he showed us in his last slide, and which I happen to think is horrible and indeed ridiculous, is better than the decorative furniture of 1885, which I think is charming, or more comfortable than the quite pleasant utility furniture of 1885.

Surely Simplicity (the dominant theme in Sir Gordon's philosophy of design) is not the only, or even the major factor that goes towards the making of good design? Surely, as a previous speaker urged, there is also a case for ornament and decoration? If simplicity were the master key then a stool with a circular top and three legs would be the *ne plus ultra* of furniture! Surely the truth is that there are no absolute standards in this field! Rather is it the truth that taste is a matter of fashion and opinion and hence subject to propaganda and indoctrination.

It seems to me utterly wrong that a small esoteric group of intellectuals (descended from Cubists and Dadaists) should in the last forty years have been allowed to grow up and impose its biased and almost perverted taste for mathematical forms, both in wall decoration and furniture, upon our whole society. I should like to hear what Sir Gordon has to say to all this.

THE LECTURER: I should like first of all to say that I think there has never been any period when there have not been some good pieces of furniture made. A lot of people talk about Victorian furniture as if it were all bad; it is not all bad, there is some very good furniture among it, and at least it had this important consideration—that it was always extremely well made. I think over the last forty years there has been much more tendency on the part of the people in the furniture trade to go back and look at what furniture was needed and made for, what were the purposes of it, rather than to make it purely for show. That is a very good thing, but it certainly does not

mean that simplicity is the only thing to aim at. It follows, in that way, architecture, because surely it would be accepted that in the nineteenth century architecture was largely a matter of what the façade looked like; you tucked anything behind the façade; but to-day the plan is all important and your façade comes out of that. I think that is really a very much sounder approach, both in architecture and in furniture.

MISS LOTTIE REIZENSLEIU: Manufacturers want to make money and manufacturers are only rarely interested in producing good design. Designs are pinched and copied. Designers are not protected by any design rights, and their work can be 'adapted' by some minor alteration. It is essential that we get some kind of design copyright that works, so that designers who show their designs get a measure of protection against having their ideas pinched. I do not know what body could take this up. The Council of Industrial Design, where I asked about this, have no mandate for this, and they advised me to write letters to the paper *Design*. I think that is quite inadequate. I know an organization exists for the protection of artists—the Imperial Arts League—but I think really after my experience and many other people's previous experience that some kind of scheme should be taken up. Which organization could effectively take this matter up?

THE LECTURER: I think we would all be in favour of its being dealt with, but when you get down to the problem it is one of the most difficult ones to solve. If copyright were too rigidly applied it might mean that no one would be able to design anything, because you would have to find out first whether someone else had designed a chair with three legs or something of that sort, and go through fifteen thousand drawings to find out. By a very slight alteration to a design you can now get away from the registered thing. What exactly is the latitude offered? I think the best way to cope with the problem is by an improvement in ethical standards in business.

SIR ERNEST GOODALE (a Vice-President of the Society): At the present moment there is a Departmental Committee sitting to consider what alterations are necessary to the Registered Designs Act, 1949, so it might be a very good opportunity if the last speaker offered to give evidence to that committee, through the Board of Trade.

MR. L. S. LEBUS: May I put a relevant question? In my humble opinion the design of the new pound note is extremely poor and if Sir Gordon agrees with me that it is very poor in design, I should like to know what action he thinks might be taken to prevent the authorities from producing money which has a less satisfactory look than it had in the past.

THE LECTURER: I agree with Sir Colin Anderson's letter on the new pound note in *The Times* to-day. The only thing I can suggest is that everyone in this room should refuse to accept any pound notes when offered them!

MR. R. O. PORTER: Could Sir Gordon use his influence to design a lecture desk for this hall, so that the lecturer does not keep popping up and down like a 'Jack-in-the-Box'? (*Laughter.*)

MR. ELLIS THIRKETTLE, C.B.E.: To-day as in the past I have listened to Sir Gordon with much pleasure. He seems to have great faith in the natural good taste, or latent good taste of the public; and I gather that he feels that if the man in the street has good furniture and other things to choose from he will usually choose the better things. Sir Gordon evidently feels that, though the ranks of designers are building up, there are not yet enough of them. I wonder whether he would indicate where he feels the blame mainly lies for the large quantities of badly designed goods that are still on sale to-day? Does it lie amongst the designers, because there are not enough good ones yet, or amongst the manufacturers who will not use the good designers? Does the cause lie in the poor taste of the buyers in the retail shops or in public demand? I rather sense that Sir Gordon feels that the retail shops are the weak link n the chain. Have I misinterpreted what he was saying?

THE LECTURER: It used to be said in infantry battalions that the men were always good, but that a good battalion depended on the officers. That is the problem. It is a question of leadership. And not only one point of leadership: you cannot pin it down to the manufacturers, to the retailers or to the designers; they are all involved really; but I think the public would on the whole buy much better things than it is shown to-day if it were offered them. But the public cannot be expected to know enough about design problems—to go and state a case for something which it has never seen. You have got to show people. On the whole the blame is shared by a lot of people. How you get at them I do not know, but I think one of the most to blame is the retailer.

THE CHAIRMAN: We have had an extremely interesting review from Sir Gordon of the trades to-day, and we have heard a very lively discussion. Sir Gordon started his paper by referring to Sir Stafford Cripps. I was honoured to claim Sir Stafford as a friend, and I often used to stay with him in his lovely house in the Cotswolds. He was, as Sir Gordon has said, a far-seeing man. Whether or not you agreed with his political philosophy you could not help admiring the clarity of his mind, the Christianity of his outlook and his general aesthetic sense; and he, like Sir Gordon—both Gloucestershire men—was influenced by the beauty of the country and buildings in that neighbourhood. I feel that it inspired them both with a love of beauty. They felt that the England of the old days, when craftsmen produced lovely things, had been lost. And when these two Gloucestershire men got together, Sir Stafford in the Ministry and Sir Gordon with these ideas, something came out of it, and between them they laid the foundation of the Council of Industrial Design and the Design Centre, and I am sure those institutions have had a great influence on the outlook not only of the public but on manufacturers as to the fundamental importance of design in industry.

I have heard Sir Gordon say that after forty years of hard work in this matter of trying to improve design he has had very little impact upon it. Well, that I think is a typically English understatement. I think that he and the Design Centre have had a really big influence. This Society has always, all over the years in which it has existed, preached the necessity of good design for a healthy British industry. We can certainly testify that in the last few years since the war, there has grown up an increased interest among the manufacturers and also amongst the public in this matter of fine design.

Now I am sure you will all wish to thank Sir Gordon for the excellent review which he has given this afternoon.

The vote of thanks to the Lecturer was carried with acclamation, and the meeting t h ended.

INDUCED MUTATIONS IN CROP PLANTS

The Fernhurst Lecture by

D. ROY DAVIES, B.Sc., Ph.D.,

of Wantage Radiation Laboratory, Atomic Energy Authority, *delivered to the Society on Wednesday, 16th March, 1960, with F. R. Horne, C.B.E., M.A., N.D.A., Director, National Institute of Agricultural Botany, in the Chair*

THE CHAIRMAN: The first time I think I heard of Dr. Davies was at Aberystwyth. This is a very pleasant sounding name to all those concerned with agriculture and with botany because of the outstanding plant breeding work which has been done there. Dr. Davies was also in America. I followed him round to some of the stations where pioneer work has been done on mutations in crop plants induced by artificial means. Dr. Davies is at present at the Wantage Radiation Laboratory, in what we know as the Technological Irradiation Group—the T.I.G. This, of course, is associated with the Atomic Energy Authority, and when I last saw their complicated and most impressive apparatus it recalled to me the story of the two ghosts. One asked the other how he came to be there, and the reply was, 'Well, I was in the car with my wife, and she said, "Be an angel and let me drive"; and I did, and I was'.

I have a very high admiration for those who are doing the pioneer work on atomic energy. I think it is one of the most remarkable phenomena of recent years that rarified nuclear physics should be combined with down-to-earth plant breeding, and I know something of the outstanding work which Dr. Davies has done to bring these together. His is a highly technical subject for the benefit of the agricultural industry, but it is one which has a very definite and close bearing on plant breeding work. I do not think it would be denied that of all the materials which go into the countryside and on to the farm, *seeds* are really the primary materials—the materials on which all production is based; and the difference between good seeds and not so good seeds rests very largely in the different heritage which they carry. That heritage is what Dr. Davies is going to tell us about.

I think we have to congratulate the Royal Society of Arts and the sponsors of the Fernhurst Lecture for having persuaded Dr. Davies to come, because at this time we hear a lot of the possibilities of inducing mutations and obtaining new varieties of crop plants in this way, and there have been a good many references in the agricultural and the national press. It is very valuable to have Dr. Davies' appraisal of it all.

We at the National Institute of Agricultural Botany, Cambridge, are in fact testing two new varieties, one a very promising new barley variety bred or induced in this particular way, which is going to claim the close attention of the people who have to decide about Recommended Varieties of barley. I won't attempt to forecast the future, but all this does indicate that now is the time when we want to have an authoritative assessment of the importance of this new technique in plant breeding and I have very much pleasure in asking Dr. Davies to deliver the 1960 Fernhurst Lecture on this important subject.

The following lecture, which was illustrated with lantern slides, was then delivered.

THE LECTURE

In 1927 two American scientists, Drs. Muller and Stadler, working respectively on *Drosophila* and barley, discovered that ionizing radiations could induce heritable changes or mutations in living organisms. Very soon after these initial studies the question arose as to whether such mutations could be usefully exploited in programmes of plant breeding, but many years elapsed before any concerted effort was made by plant breeders to elucidate the problem. Even to-day the answer is not readily available, though we are now in a position to evaluate the situation more critically. The early reluctance to enter this field of study was due in part to the fact that American geneticists especially were sceptical that any, other than deleterious, changes could be induced. Pioneering work by German and Swedish workers helped to overcome this early scepticism to some extent, but it was the post-war programme of atomic research and the greater availability of sources of ionizing radiations that gave a final impetus to programmes of research on the production and utilization of induced mutations in crop plants.

Since the biochemical nature of hereditary factors or genes is not known, the fundamental changes involved in the production of mutations must remain undefined. We can merely recognize genes as units of function, located in a particular segment of chromosome in the cell nucleus. After exposure to mutagenic agents such as ionizing, and even some non-ionizing, radiations, and a great variety of chemicals, the unit of function may be changed or lost, structural alterations may occur in the chromosomes and even changes in chromosome number may occur. The term mutation is often loosely defined to cover all these, but unless otherwise specified, in this lecture the term will be confined to gene mutations.

The various forms of radiations utilized produce mutations by transferring their energy through ionizations or excitations to sites within or near the genetic material, thereby increasing the chemical reactivity of those sites, whereas chemical mutagens interact directly or indirectly with the genetic material. Spontaneous mutations probably arise due to a variety of causes such as metabolic upsets, physical and chemical changes within or in the environment of the tissues, and natural radiations. The rate of occurrence of these spontaneous mutations has been variously estimated for different genes, tissues and organisms as being between 1 in 10^5 to 1 in 10^8 genes, but after exposure to mutagens this rate may be increased up to a thousandfold. However, most mutations, whether spontaneously or artificially induced, are deleterious and of no value to a plant breeder; in fact, it has been estimated that possibly only one out of every eight hundred induced mutations could be potentially of value. This rare occurrence of the event sought necessitates growing very large populations of plants, and in such large populations, a detection and recognition of the desirable change may be difficult. If mutants exhibiting such obvious changes as differences in height, colour or even disease resistance are sought, then the problem is minimized, but more subtle changes such as those in yield are not as easily found.

Another difficulty which arises when this technique is adopted is that induced chromosomal damage frequently leads to sterility or even an elimination of the cell bearing the damaged chromosomes, and both of these factors result in the non-recovery of mutant genes. Nevertheless in spite of these and other difficulties, useful mutations have been produced, detected and utilized in breeding programmes, and they have stimulated research into ways and means of minimizing the disadvantages of the technique. For example, it is now known that manipulation of various physical, chemical and biological factors within the organism and in its environment can lead to changes in radiosensitivity, amount of chromosome damage and the frequency and spectra of mutations, and these factors will now be considered briefly in relation to their effects on the response of plants to radiations. Since so little is known of chemical mutagens they will not be considered in this context.

Of the physical factors, the type of radiation utilized is of considerable importance. The various radiations which have been used include the low energy ultra-violet radiation, and the ionizing X- and γ-rays, α and β particles, and thermal and fast neutrons. Ultra-violet rays are of limited value for genetic work in higher plants because of their poor penetrating ability, and hence mutation studies with this agent have been confined to analysing the results obtained after treating pollen. It has been suggested that it produces less chromosome damage than the other radiations considered. The sparsely ionizing radiations X-rays and γ-rays have been most extensively utilized in plant breeding work, and they are of particular interest in that their biological effects can be modified very markedly by manipulating and controlling various factors within the organism and its environment. β particles are somewhat similar in action—the most common sources of this type of radiation being the radioisotopes P^{32} and S^{35}. These can be incorporated directly into a growing plant, but it is doubtful whether there is any distinct genetical advantage gained by treating biological material in this manner. There have been comparatively few studies of the effect of the very densely ionizing α particles, but they are of somewhat limited value because of their low penetrating ability. Finally, thermal and fast neutrons produce dense ionizations, but are not limited in terms of penetrating ability in biological material, and hence have been utilized extensively for inducing mutations. Because of the high ion density of their recoil protons, their effects cannot be modified as markedly as the γ- and X-rays. In practice the choice for the plant breeder usually lies between thermal and fast neutrons on the one hand, and X- and γ-rays on the other, and at present the relative merits of the two classes have not been defined clearly. Neutrons certainly have the high relative biological efficiency, that is, for a given amount of energy absorption they induce more damage. Swedish workers have stated that neutrons are fifty to one hundred times as efficient as X-rays in inducing mutations, and ten to twenty times in inducing chromosomal changes, whereas American scientists obtained a similar number of mutations with both when the frequency was measured on the basis of the numbers of chromosomal changes induced. Again, the latter have claimed no differences in the spectra of mutations

FIGURE 1. 120 *Curie* Co_{60} *installation at the Wantage Radiation Laboratory*

produced, whereas the former indicate that differences do exist. In the absence of more definite evidence there is at present little justification, apart from availability of sources and convenience, for a plant breeder stating a preference for one as opposed to another type of radiation. Figure 1 shows a Co_{60} gamma source at the Wantage Radiation Laboratory of the United Kingdom Atomic Energy Authority which has been specially designed for the irradiation of whole plants, seeds or pollen. The 120 curie Co_{60} source is stored in a lead 'coffin' sited on the floor of the cell and can be raised vertically by remote control through a guide tube to any height up to 100 cms. above the turntables on which the plants are located. Dose rates of 600 to 6,000 rads per hour are available by varying the distance of the turntables from the central guide tube; uniformity throughout the volume being irradiated is ensured by rotating the turntables at 1 r.p.m.

With the less densely ionizing radiations, and certain types of mutational event, a reduction in the dose rate or a fractionation of the dose into two or more parts, results in a lowering of the mutation rate. A few years ago it was suggested that low dose rate treatments or chronic irradiations would be advantageous, as they would allow an irradiated plant to suffer a minimum amount of physiological damage whilst permitting an accumulation of mutations. To allow such treatments to be undertaken, gamma fields were constructed, but as far as the

plant breeder is concerned, they now appear to have no advantage over installations permitting acute treatment only, and are certainly more expensive to construct. Environmental conditions can not be easily controlled in gamma fields; they have to be sited in remote places away from laboratories, and though they have been considered valuable for treating large specimens such as fruit trees, it has yet to be shown that chronic irradiation of these is any more efficient than acute treatments of cuttings which can later be rooted, or grafted on to unirradiated stocks. Again, let us assume that a plant is exposed for a month in a gamma field, but within the first week of treatment a desirable mutation is induced; then for the remaining three weeks that plant is exposed to physiological and genetic damage which may result in the non-recovery of that particular mutant.

The effect of temperature both during and pre- and post-treatment has been extensively investigated and shown to be important in determining the biological response of tissues to sparsely ionizing radiations. For example, seeds exposed at ca. −190°C. show much less damage than those irradiated at room temperature, and seeds immersed in water at +90°C. immediately post-irradiation are similarly protected. Germination at sub-optimum temperatures results in an enhancement of damage, presumably due to a lowered rate of metabolism and an inability to repair cell damage. Again, the water content of tissues is important in this respect; for example, dry barley seeds (ca. 6 per cent water) are more radiosensitive than wetter ones (ca. 16 per cent water). Finally, the injurious effects of X- or γ-radiation on dormant barley seeds increase with the length of time that the seeds are stored after irradiation and before hydration. This storage effect, as it is termed, is more marked in dry than wet seeds, and is enhanced in the presence of oxygen.

Of the chemical factors that can affect the response of biological material to X- and γ-rays, the effect of the atmosphere during irradiation has been investigated most thoroughly. Gases such as oxygen, carbon dioxide and carbon monoxide enhance the effect, whilst nitrogen and the inert gases protect tissues. Similarly a few chemicals such as ascorbic acid, cysteine and thiourea reduce, whilst others such as potassium cyanide and hydrogen peroxide enhance the effect of a given dose. The chemical content of tissues is also known to be important—those deficient in Calcium and Magnesium being more radiosensitive, whilst those deficient in Boron are more resistant.

There are numerous biological factors which are important in this context, including genotype, chromosome number, tissue, age, stage of cell division, and stage of development. Species vary greatly in their sensitivity, a dose which would kill 50 per cent of exposed plants in some *Pinus* species being about 4,000 rads, whilst for some *Brassica* species the value is near 100,000 rads. Little is known of the basic reason for these differences, but even two varieties or two sister plants differing very little in genotype can vary in sensitivity. If closely related species exhibit a range of chromosome numbers, it will be found in general that the higher chromosome number forms are more resistant. Tissue differences have not been investigated thoroughly—seeds are certainly more

resistant than whole plants or gametes as their cells are in a resting stage, but the more subtle differences, for example, between root cells, pollen mother cells and pollen grains have not been fully elucidated. As far as the plant breeder is concerned, the treatment of seeds has a number of obvious advantages—they are available in bulk, can be easily handled and can tolerate a great range of environmental conditions. Regarding the other factors—aged seeds are more sensitive than fresh seeds, whilst the stage of cell division, especially during meiotic stages, has been shown to be most important both in terms of the amount of chromosome damage and number of mutations induced. The importance of stage of development has been indicated by the work on pollen, where it has been shown that most mutations are produced if pollen is irradiated three to five days before anthesis, and by the fact that germinating seeds are more sensitive than resting seeds.

When all the information available from studies of these and other factors is considered, it is apparent that the response of a tissue to a given dose of sparsely, but not densely, ionizing radiations can be greatly modified. Modifications of practical value would include inducing as high a frequency of mutations as possible, but with a minimum amount of chromosomal aberrations and physiological injury. However, though the plant breeder can exercise some degree of control in this respect, it is still very far removed from the Utopian idea of a direction of the mutation process.

Chemical mutagens have not been as extensively investigated as ionizing radiations, but already some are proving of considerable interest to the plant breeder. For example, nebularine, a purine–9–d–riboside, is a mutagenic agent which does not produce any chromosomal breakage, and two other compounds—ethylene oxide and ethlene imine—have been shown by Swedish workers to produce up to four times as many viable mutations as X-rays, but with no increase in chromosomal aberrations.

In spite of the inefficiency of the techniques for inducing mutations, useful variation has been induced in many species of crop plants, some has been incorporated into breeding programmes and a few new varieties have resulted. In Sweden, barley, wheat, oat, pea, soya bean, flax and mustard mutants have been produced which vary in yield, straw strength, earliness and other characters, and new varieties have resulted in some instances. These include a higher yielding white mustard, oil-rape and pea, and a stiffer-strawed variety of barley. One interesting report from Sweden claims that they have produced barley mutants which flower earlier and hence can be grown in more northerly latitudes—such variants not being available to them previously. From Germany plant breeders have reported cereal variants having higher grain yield, up to eight days earlier flowering, stronger straw, higher protein content and improved disease resistance. The naked-kernel mutants of spring-barley reported by Scholz from Germany offer an instructive example of the use of radiation. A gene 'n' for nakedness can be introduced from non-adapted varieties of barley, but in spite of intensive work for many years, attempts to produce high-yielding naked lines were unsuccessful After irradiation, naked mutants were found having the same

yield as the parent lines. From that country there have also been reports of some very promising blackcurrant mutants, which vary in terms of size of bunches, taste, seed number, and earliness. These last results are especially encouraging as progress in the breeding of this crop by conventional methods had been extremely slow and unrewarding. In Britain a self-fertile form of cherry has been produced from the normally self-sterile type, that should be less dependent on insects for pollination and therefore give a better yield in colder regions and unfavourable seasons. A considerable number of cereal mutants have been produced at the Plant Breeding Institute at Cambridge, but none has proved very valuable as yet. American workers have reported variants similar to those mentioned previously, and in a great variety of crops, including horticultural species. Frequently the latter exhibit gross changes in form and colour which might be deleterious in agricultural crops but have considerable value as curiosities in horticulture. The most thorough studies in America of the potential value of mutation breeding have been undertaken by Gregory. In 1949 he instituted a programme for the improvement of groundnut varieties, and ten years later he had produced a new variety NC4X, by mutation breeding, which had a higher yield than the original variety (2,925 as opposed to 2,759 lb. per acre), improved disease resistance and a lower percentage of damaged and cracked pods. It is as well to note here that a few years ago, a great many claims were made by American workers regarding the induction of mutants which were resistant to various diseases, and their early optimism regarding the value of mutation breeding was to a large extent based on these claims. However, more recent analyses of these results, and a repetition of some of the experiments under more critical conditions has shown that most of these claims were not justified, and the disease-resistant forms were not in fact due to mutations, but to natural crossing of the irradiated plants with resistant varieties growing in the vicinity.

We can now make a preliminary evaluation of the status of mutation breeding, bearing in mind the techniques that are available at present, and the results that have been achieved.

Firstly it has yet to be shown conclusively that radiation can produce anything new, that is, a mutant not occurring naturally. There have been indications of this in the claims of American scientists regarding the production of winter hardy oats and a new source of stem rust resistance in the same species, in the production of different types of leaf marks in *Trifolium repens*, and in the production of early maturing forms of barley in Sweden, but conclusive proof of these claims is difficult, especially in view of the problems of exploring all naturally occurring genotypes.

Secondly, if the vast majority of induced mutations are merely duplications of those which occur naturally, then the relative merits of this technique and the more conventional methods of plant breeding must be considered in terms of economics—time, space and labour requirements. No valid comparisons of the two techniques in terms of these factors have been undertaken, and the potential amounts of variability which could be released by hybridization and

mutation has yet to be compared. Gregory's results with the breeding of peanuts are of interest in this connection. In 1949 he instituted two programmes of breeding for the improvement of groundnut varieties—one based on mutation and the other on hybridization. Ten years later he had succeeded in producing two new varieties—one by either method, both of which were very similar in terms of yield and general performance, and considerably superior to the original variety. Actual figures for yield in lb./acre were

Original variety NC4 — 2759
Mutant variety NC4X — 2925
Hybrid variety NC2 — 3059

That this technique offers no short cut to success is also indicated by the fact that Down & Anderson produced a mutant form of *Phaseolus vulgaris* in 1941, but seventeen years elapsed before it was suitable for release to the growers. Similarly Swedish workers produced a mutant form of barley in 1947 which is being released this year as a new variety—Pallas.

Thirdly, it has been suggested that this new method of breeding would be useful for adding a single characteristic to an otherwise well-adapted variety—in other words, one would not upset the genotype unduly by this method, whereas if one attempted to introduce a single desired character by hybridization, the background genotype would be considerably altered. There are a few examples of such situations; for example, Indian workers have succeeded in producing, from awnless forms of wheat, awned mutants which differ little, if at all, in other respects from the original variety. Attempts to introduce this character by backcrossing have already taken a considerable number of years, and the genotype is still different from the original awnless forms. A similar situation existed with the naked barley mutants reported by German workers and discussed earlier. In general, however, instances such as these two quoted are exceptions rather than the rule, and one finds that a mutation induced in one gene is almost invariably accompanied by numerous changes in the remainder of the genotype. It then follows that after the initial production of the desired mutation, a considerable amount of backcrossing has to be undertaken to restore the remainder of the genotype. In other words, this technique is not likely to result in the production of new varieties immediately, but is merely a method of inducing variability, and the conventional plant breeding techniques of selection and hybridization must follow.

Finally, there are certain situations where it is likely that induced mutations can make significant contributions to plant breeding. The exceptions mentioned previously must be included here, but there are other situations where, for example, a loss mutation is desirable, and a good example of this is the production of self-fertile cherries from the normally self-sterile forms. In the case of asexually propagated plants also, where due to the length of the life cycle and their genetical complexity, conventional methods of breeding are difficult, it is possible that artificially induced mutations could prove valuable, and the work on blackcurrants seems to support this contention.

Up till now, the value of radiations and mutagenic chemicals has been considered solely in terms of the production of useful variants in cultivated varieties of crop plants. However, it is conceivable that they could be valuable in other respects also. One particular application which we have investigated intensively at the Wantage Radiation Laboratory is the possibility of using ionizing radiations to overcome the barriers to crossing that frequently exist between our cultivated forms of plants and their closely related wild species. Frequently one finds that valuable characters, such as resistance to diseases, exist in these wild species, which it would be desirable to introduce into the cultivated forms, but this introduction is often precluded by the barriers to crossing between the two forms. The technique we have adopted in our work is to irradiate either male or female gametes at all stages of development from premeiotic cells to mature gametes with a range of doses of γ-radiation. These irradiated gametes of one species are then utilized on successive days as they mature, for crossing with unirradiated plants of the other species. In this way we have undertaken very comprehensive programmes, involving thousands of crosses, in a range of species. Of the series we have attempted, those between *Hordeum vulgare* and *Hordeum bulbosum*, and between *Antirrhinum majus* and *Antirrhinum orontium* were wholly unsuccessful. That between *Vicia faba* and *Vicia narbonensis* resulted in a significant increase of large aborted ovules over that obtained in the control series, and that involving *Lycopersicon esculentum* and *Lycopersicon peruvianum* resulted in the production of two hybrids, but in the latter instance the very rare production of a hybrid has been reported previously by other workers. The final series involved *Brassica oleracea*, *Brassica campestris* and *Brassica nigra*, and of the many possible combinations, the one involving *B. oleracea* x *B. nigra* proved extremely interesting. No hybrids were obtained in the control series but after irradiation a total of 35 hybrids were produced (Figure 2). Swaminathan has reported from India the production of hybrids between *Nicotiana tabacum* and *Nicotiana rustica* after irradiation, and from Japan there have been similar reports of new hybrids between *Avena strigosa* and *Avena barbata*, and between *Avena strigosa* and *Avena sativa*.

Though some new hybrids have been produced with the aid of mutagenic agents, we have once again to evaluate the potential usefulness of this technique. It is obvious that it is not going to succeed in overcoming many instances of interspecific incompatibility, and since there is such a diversity of types of barriers to crossing, it will probably be impossible to extrapolate from our present results and predict the results in any other cases. Again, even in those instances where it has succeeded, one has to consider whether the same end result would have been achieved more easily by screening naturally occurring genotypes in order to determine whether some more compatible forms exist, or whether in some instances other techniques such as the *in vitro* culture of hybrid embryos would have proved even more profitable.

Other specialized ways of exploiting ionizing radiations in plant breeding have involved utilizing induced chromosomal changes. In an earlier section chromosomal changes were referred to as undesirable features accompanying the process

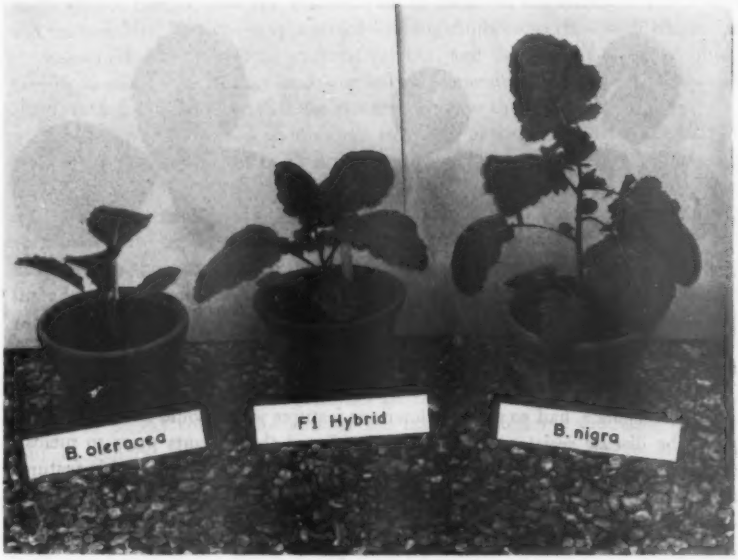


FIGURE 2. *Plants of* Brassica oleracea, B. nigra *and their interspecific hybrid*

of mutation, as they can often lead to sterility. Occasionally, however, chromosome breakage may have some value, and several examples may be quoted to illustrate this point. One involves the possibility of separating two genes or two parts of a single gene, one of which is useful and the other deleterious, but which are so closely linked together on the chromosome that it is difficult to separate them naturally. In oats there is a situation in which a dominant genetic locus conditions susceptibility to Victoria blight and resistance to several races of crown rust, and it will be of interest to follow the attempts being made to separate the two parts by radiation. We have shown that two parts of a single genetic locus in clover can be separated fairly easily by radiation, but are not separable in nature (Figure 3). Again, the changes produced by the breaking and rearranging of chromosomes are extremely valuable in locating the relative positions of genetic loci on chromosomes, but the outstanding use of the breakage phenomenon has been demonstrated by an American geneticist, Dr. Sears. One of the prime problems facing plant breeders in America is that of the leaf rust diseases which attack cultivated wheats. *Aegilops umbellulata*, a wild grass related to wheat, is resistant to some of these diseases, and moreover there is no effective barrier to introducing this resistance into cultivated wheats. However, progress in the utilization of hybrid plants has been impeded by the fact that wheat plants having the additional chromosome from *Aegilops* bearing the

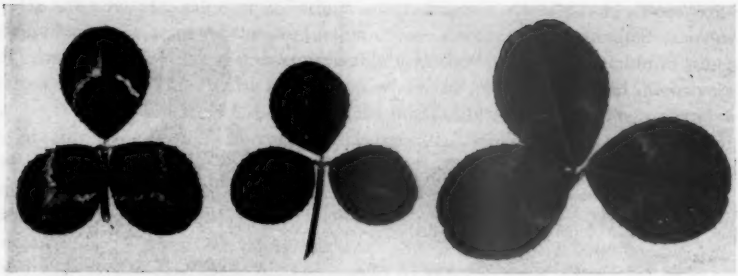


FIGURE 3. *Leaves of* Trifolium repens *showing on the extreme left a normal leaf, and to the right leaves in which the two component parts of the leaf mark have been separated*

disease resistance, had so many deleterious features which could not be separated from the disease resistance. Dr. Sears irradiated these plants prior to meiosis, and in this way broke the linkage of disease resistance and undesirable features, and translocated the segment of chromosome bearing the desirable gene on to one of the wheat chromosomes. The plants which he ultimately produced were distinguished from normal wheat only by their rust resistance and slightly later maturity. This work has been an outstanding achievement in the field of plant genetics, and is unlikely to have succeeded without the use of mutagens. Similar attempts are now being made at other research centres to transfer characters from one species to another, but it remains to be seen whether this technique can be exploited in many other instances.

In summarizing briefly the position of mutation breeding to-day, it is as well to remember that in Britain there is in general very little enthusiasm for the technique, and that in America the mood of tremendous optimism of a few years ago has changed to one of extreme caution. In Sweden and Germany, where during the last twenty to thirty years so much has been done to exploit the technique, there is much optimism that it can make a significant contribution to plant breeding. Elsewhere the tendency is for enthusiasm to be inversely related to knowledge and experience of the technique. As yet a total of only seven new varieties have been produced by mutation breeding, and even in their production conventional breeding techniques have still played a large part. It must be remembered, however, that a considerable proportion of the research effort on this topic has so far been confined to exploratory work concerned with techniques.

Future research work in this field will probably include studies of the effects of modifying factors, the relative merits of pollen, whole plant and seed irradiation, the sensitivities of different cell stages, the value of other radiations such as ultra-violet and α particles, the value of polygenic rather than major gene mutations, methods of modifying the competition of normal and mutant cells in

multicellular tissues, and the relative rôle of induced mutations in inbreeders and outbreeders. The more specialized investigations concerned with the use of chromosomal changes will be pursued further, and the field of chemical mutagenesis is still in its infancy and worthy of a considerable amount of research effort. It is in this last field that the greatest hope for this technique lies.

With the present status of mutation breeding and the inefficient techniques available to us to-day, there is little justification for a plant breeder seeking variability from irradiated material, if it is already available naturally. There are exceptions, but in general it has yet to be shown conclusively that the required variability can be produced more quickly, more economically, or with less utilization of space and labour by mutagens than by hybridization. The exceptions include some examples of loss mutations, mutations in asexually propagated plants, and those in horticultural crops where bizarre forms often have commercial value. Claims that mutation breeding is essential because we are running out of variability do not appear to be justified. It is true that in some instances where, for example, hybrid maize programmes are being introduced, gene pools may be restricted unless special precautions are taken to conserve old land varieties, but in general, the reservoirs of variability which are available in natural populations and which are being released continually by hybridization, are very great.

Future work, especially with chemical mutagens, may drastically modify our concepts regarding the status of mutation breeding, but it is obvious that much research work has to be undertaken before a full evaluation of its true potential is possible.

DISCUSSION

MR. P. K. SHAHANI: Could the lecturer tell us the reason why the biochemistry of the cells has not yet been found out?

THE LECTURER: The biochemistry of genes (which is what one is ultimately interested in) is a very specialized field which we are only starting to exploit, and we have very little understanding of the basic biochemical pathways of some of our genes.

DR. A. D. MCKELVIE (Plant Breeding Institute, Cambridge): I wonder if Dr. Davies could say anything about the future possibilities of producing different types of mutations after different treatments? At Cambridge at the moment we are doing a lot of work on mutations, trying to find out if mutagenic agents do in fact produce differences in mutation spectrum. So far we have not found any evidence of this but the programme is in its early stages and will continue for some time. Dr. Davies is probably aware of what is being done by the Fahmys at the Chester Beatty Institute with alkylating agents on *Drosophila*. They claim that some of these chemicals produce mutations not previously seen after radiation.

THE CHAIRMAN: Dr. McKelvie, before Dr. Davies answers would you care to say what mutagens you are using at Cambridge to cause the mutation?

DR. MCKELVIE: At Cambridge we are not working primarily on crop plants. We are using a small annual, *Arabidopsis thaliana*, which occurs naturally in this country. We use it because it flowers in three weeks from sowing the seed so that you can obtain a lot of generations in a year; and we are testing the effect of several mutagens on the mutation rate and spectrum of this plant. We are using X-rays as the sole

source of radiation because it is felt that the differences between types of radiation will be less important than between radiation and various chemicals. The chemicals we are using include some of the alkylating agents that Dr. Davies mentioned. We are also using nebularine, fluorouracil and several other chemicals which act upon the cell nucleus. Dr. Davies is aware that we do not know how these chemicals produce mutations, but at least they should have different modes of action in the cell.

THE LECTURER: I am delighted to have Dr. McKelvie's comments on this work. I suspect he knows a great deal more about it than I do. In relation to this particular question (the work of the Fahmys), I must apologize for not mentioning it and for having to rush unduly through this lecture. Chemicals are claimed to produce a different spectrum of mutations in *Drosophila*, which is the organism with which they are working. But as far as I am aware there has been no repetition of this work. At present I personally am not in a position to judge their results, but certainly there are indications that chemicals do produce a different mutation. I am very interested to hear of what Dr. McKelvie is doing at Cambridge and I think these chemical mutants he is using are the answer to many problems.

MR. R. A. CUMBERLAND: In octoploid strawberries, which already have a fairly wide variation, would there be any advantage in using mutagens?

THE LECTURER: Again, that is a very difficult question to answer. If you have variability available in your strawberry population, I would say every time, use it and do not seek the variability which is produced by mutation, because you are so liable to run up against the problem of sterility for one thing, and the chances of your finding a desirable mutation are so small. From an academic point of view these studies are always justified, but if I was a practical plant breeder, I think I would have to be very desperately in need of some variation before I could justify doing mutation breeding. I do not know what some of the other experts in the audience feel, but this is my own personal point of view.

DR. P. S. HUDSON (Commonwealth Bureau of Plant Breeding and Genetics, Cambridge): I think on this point it might be of interest to the speaker and the audience for me to mention a conversation I had with Dr. Lein, who it will be remembered was one of the earliest workers on mutation breeding in Germany—in fact, anywhere. Dr. Lein is now working for a commercial firm as a plant breeder, and when I asked him whether he was using mutation breeding, he said, 'Oh no, not any longer'.

DR. JOHN K. JONES (Department of Agricultural Botany, Reading): Whether you use mutation commercially seems to me to depend very much on whether you feel it is possible to change one thing at a time. I was surprised to hear that you regard this as so difficult that any attempt to induce mutations in individual genes is not worth while. Chromosome breaks have frequently been induced at one place, for example by Sears, and I suggest that it is not really so difficult to change only one gene at one time. The remaining problem is whether the frequency of desirable change is sufficiently high.

THE LECTURER: Yes, it is certainly true, you can change one gene at one time. In wheat, the suppressor gene for awn formation has been eliminated and awned varieties of wheat produced which are no different in any other respect from the awnless varieties. There are other instances—the naked-kernel mutants in barley is an example. But this is not the general case, and I would quote an eminent American worker in this respect; Dr. Frey of Iowa once stated at a symposium that you may well induce a single gene mutation and not affect the rest of the genes at all; but that in general, if you induce a mutation, and this I quote, 'You also introduce an awful lot of dirty genes'. What you say is perfectly true, it can be done in some instances;

you can just change the one character you want; but in general you will find that you have changed a tremendous number of other characters.

DR. KAMLA KANT PANDEY (John Innes Horticultural Institute): I should like to know how Dr. Davies produced these hybrids? At what stage did he overcome the barriers to crossing between species?

THE LECTURER: When I was trying to overcome the barriers to crossing between two species, at what stages did I irradiate the plants and what was my procedure? Well, let us take the two examples, *Brassica oleracea* and *Brassica nigra*. Our programme would be this: we would cross *Brassica oleracea* and *Brassica nigra*, as controls; we would do the reciprocal cross *Brassica oleracea* x *Brassica nigra*, again as controls; then the radiation programme would be this, first *Brassica oleracea* x *Brassica nigra* with the female irradiated. We would irradiate the female at all stages from the premeiotic divisions of the egg right up to maturity; we would thus be testing every successive stage, and every alternate day we would be crossing as successive mature eggs developed. That would be the first thing—irradiate the female at all stages. We would also irradiate with a range of doses, usually from about 50 rads to about 3,000 rads. The next cross would involve irradiating the male parent, which in this case would be the *Brassica nigra*. Again we would irradiate at all stages from meiosis right up to mature pollen again with a range of doses. That is the second cross. Then we would do the reciprocal, and take *Brassica nigra* as the female and irradiate that at all stages of development with a range of doses, and then the last cross would be *Brassica oleracea* as the male—irradiated at all stages of pollen development with a range of doses.

So in any one crossing programme there were thousands of crosses involved. All the female plants were emasculated every time. It involved a tremendous amount of work, and the returns for it were slight.

DR. D. J. GRIFFITHS (Welsh Plant Breeding Station, Aberystwyth): I should like to compliment Dr. Roy Davies on his very lucid and objective account of irradiation breeding, and I wish to thank him for presenting the pros and cons of the method as a technique of crop improvement. Speaking from experience of irradiation breeding studies conducted on winter oats over the last five years, I would also stress the need for a critical appraisal of the method; to be of use in a practical improvement programme, mutagenic techniques must be judged by comparison with other methods of achieving similar end results, as for example hybridization and selection. Comparisons between irradiation breeding and that by means of intervarietal hybridization and selection have led us to the conclusion that if the character sought does not exist in the collection of genetic material available to the breeder, the attempts to produce it *de novo* through irradiation are fully justified irrespective of the other limitations of the method, but I must state that it is worth while searching very hard indeed for the required variation in the wild before resorting to its artificial induction through ionizing radiations. When the desired variation is available, careful selection of parents for hybridization ensures a much higher probability that variation in the desired direction will be induced than by the irradiation of one of the parents.

I should like to ask Dr. Davies one point; if he were to initiate an irradiation programme with the cereals, would he irradiate seeds or pollen?

THE LECTURER: The answer to that, I hope, we shall be able to give in exactly one year's time. This is one of our main programmes at present: to compare the amount of polygenic variability which is induced when you irradiate inbred *Antirrhinums* (these have been inbred for about twenty years) as seed, and as pollen. We have undertaken preliminary programmes of pollen irradiation of several species. The first one involved *Melandrium album*, and we wished to determine exactly how much variability was induced when you irradiated mature pollen. We found there was a tremendous amount of variability induced for flowering time, in this particular

species. We were so encouraged by this result that we then went on to irradiate barley mature pollen in the hope that we would be equally successful. We undertook quite a big programme, and scored flowering time, height, tiller number, and ear length. After exposure to a range of doses ranging from quite low doses, 250 rads, up to the lethal dose, the net result of two years' work was that we found that we had induced no variability whatsoever in barley after irradiating pollen.

The next stage of this programme involves a comparison of the amount of quantitative variability produced when you irradiate the different stages of barley pollen development from premeiotic stages right up to maturity. We have taken this programme up through the first generation (x 1 generation) but in view of our disappointing results last year after irradiating mature pollen, I feel it is not worth pursuing this particular problem further.

If I was undertaking a practical programme, I think I would concentrate on seed irradiation until we have more evidence regarding pollen irradiation. Pollen irradiation can be difficult due to problems of handling, and the same quantity of x material cannot usually be produced as with seed irradiation.

PROFESSOR G. C. VARLEY (Hope Professor of Entomology, Oxford): The point you made that the tetraploids and octoploids were less affected than the diploid forms suggests that a reasonable proportion of the mutants that are produced are possibly recessives. To what extent is your technique directed to discovering recessive mutants?

THE LECTURER: I would say that 99.99 per cent of mutations are recessive. This is probably the reason why you get this reduced sensitivity in high polyploids—the recessives are just masked by the normal dominant alleles. Certainly we have never found dominant mutations and if anybody does find one his first thought should be one of suspicion, that it is a contaminant.

MR. WALKER (Messrs. Bees Ltd.): Is one more likely to get induced mutations in plants where one has a proportion of natural mutations? In roses, for example, where quite a lot of varieties are natural mutations?

THE LECTURER: In general if you have a gene which shows a high rate of spontaneous mutation the induced mutation rate is usually very high too. The cholorophyl mutations which I showed you have a fairly high spontaneous mutation rate, and the induced rate is very high. In the case of the roses—if you have no variability in your natural population I would say quite definitely you are justified in trying to produce a mutant type of rose. Horticultural plants are probably among the most promising for this technique because of the value of bizarre forms. In agricultural crops such mutants would have to be thrown out immediately.

MR. D. M. PITKETHLY (Charles Sharpe & Co. Limited, Seedsmen, Sleaford, Lincs): I should like to ask whether Dr. Davies thinks that the types of mutation coming from radiations are more frequently less beneficial than naturally occurring mutations?

It seems to me that in naturally occurring mutations there is a natural selection which will make many of them disappear before they are noticed, and only those giving an advantage become apparent; whereas in the artifically created ones we have all the effects, both good and bad, to choose from. Does Dr. Davies think that the artificially created ones are more lethal, should I say, than the naturally occurring mutations?

THE LECTURER: I would say that from the evidence in *Drosophila* the induced mutations which you get are almost exactly the same as the spontaneous mutations.

DR. L. A. DARBY (Glasshouse Crops Research Institute): Being associated with horticulture I am presumably classified as being bizarre, but I should like to comment about my experience with lettuce and chlorophyl mutants. A programme was initiated three years ago to attempt to produce a winter hearting lettuce, a lettuce which would

heart in short days, but of paler colour than existing types. Rather cautiously I decided to tackle this in both a radiation programme and also in an orthodox breeding programme. Over three years the proportion of the total material devoted to the radiation programme has fallen from 50 to 10, and then down to about 3 per cent. This is very much in keeping with what Dr. Davies has said.

THE LECTURER: I know of Dr. Darby's work and am very interested in it. I hope that I have not been too pessimistic, in this lecture and discussion. One tries to keep a sense of perspective; do not think I dismiss the technique completely out of hand. On the other hand, one must be very careful not to consider it as a panacea for all the plant breeder's ills. In some cases I feel sure the technique is going to be worth while, but one must have highly specialized knowledge and think very seriously before deciding to use it.

Though I have tried to present a balanced picture, my own feeling is that in general the mood should be one of pessimism rather than of optimism. But it must not, I repeat, be dismissed completely. It is worth while doing a lot more research before we finally make our decision as to what its contribution can be, and the sort of work which Dr. McKelvie is doing at Cambridge is most valuable.

THE CHAIRMAN: I should first like to say on behalf of us all how grateful we are, both to the Royal Society of Arts for arranging this meeting, and to the sponsors of the Fernhurst Lecture.

There are so many sides to the comprehensive survey we have heard, but I am sure you will all have noted with very much interest Dr. Davies' remark that induced mutations on the whole have not given a high proportion of really important and valuable improvements. I know there is a lot of interest at present in other countries as well as in Britain, in the encouragement of plant-breeding. Perhaps it is rather reassuring to the breeder who has spent perhaps fifteen years in hybridizing and testing his material, to know that there is not a very big chance that someone else can do just as well in two or three years simply by inducing mutations in the established varieties.

I am sure you will all agree with me that Dr. Davies has made a very important and difficult subject both intelligible and interesting, and on your behalf I should like to thank him most warmly for his lecture.

The vote of thanks to the Lecturer was carried with acclamation and, another having been accorded to the Chairman upon the proposal of Mr. A. R. N. Roberts, the meeting then ended.

CHANGING PATTERNS OF AFRICAN LAND USE

A paper by

WILLIAM ALLAN, C.B.E., B.Sc., A.I.C.T.A.,

Simon Senior Research Fellow, Department of Social Anthropology and Sociology, University of Manchester,

read to the Society on Tuesday, 22nd March, 1960, with Sir Hilton Poynton, K.C.M.G., Permanent Under-Secretary of State, Colonial Office, in the Chair

THE CHAIRMAN: Mr. Allan has had a long career in the Colonial Agricultural Service. He was for twenty years in Northern Rhodesia, then for six years in Mauritius and finally became Director of Agriculture in Cyprus. Since he retired he has been making trips to Africa. I have always understood that the primary duty of the Chairman when introducing a lecturer is to steal neither the lecturer's thunder nor his time, and I am sure that all of you are very anxious to hear Mr. Allan and to see the slides which he intends to show. I would only say that this subject of land use in Africa is at the moment an extremely important one, and not only on scientific and professional grounds. Use and tenure of land is one of the most sensitive political subjects there is; it always touches people on the raw, so to speak; and with this very rapid political advance which is going on in Africa at the present time, any question relating to the use and development of the land is bound to arouse emotions.

The following paper, which was illustrated with lantern slides, was then read.

THE PAPER

Traditional methods of African land use are still commonly described as 'shifting cultivation', a term which has certain inadequacies when applied to a great multiplicity of systems differing as much from each other as the agriculture of Western Europe from that of China. It is more accurate to apply the term to soils rather than systems, for, as Lord Hailey has put it, 'shifting cultivation is less a device of barbarism than a concession to the character of the soil'. This means, simply, that African methods of land use are adapted to the limitations of soil and environment, as any viable system of agriculture must be. The danger of disregarding or underestimating these limitations, even with the techniques and resources at our disposal, is well illustrated by the failure of 'the grisly Groundnut Scheme', as Negley Farson calls it, and other ambitious post-war projects; failures that cost the British taxpayer many millions of pounds.

THE BASIS OF AFRICAN AGRICULTURE

For subsistence cultivators crop failure does not mean mere financial loss. It means—or did mean, before suzerain governments distributed famine relief—starvation and the dispersal or destruction of the community. We may

assume, therefore, that as communities of men changed their methods of land use from hunting and food gathering, or herding and shepherding, to an increasing dependence on hoe cultivation, they acquired a substantial knowledge of the soils they used and a means of recognizing and distinguishing them. Without this knowledge, hoe cultivation on the weaker soils which cover much of Africa would have been altogether too precarious. No community could have survived for long. All the cultivating peoples did accumulate—and, where the systems have not altogether broken down, still preserve—a large body of unwritten knowledge. The 'shifting' cultivator knew and understood his environment. He could assess the fertility of a piece of land and its suitability for one or other of his crops by the vegetation which covered it and the physical characteristics of the soil, and he knew how long he could cultivate each variant and the period required for the restoration of fertility. His indicator of initial fertility was the *climax* vegetation and his index of returning fertility the succession of vegetational phases following cultivation. This fund of ecological knowledge was the basis of 'shifting' cultivation.

The ecological approach is a key to the understanding of traditional African systems of land use. Only from this point of view can we see the habitat through the eyes of the inhabitants and understand its limitations for a people with no material resources but the hoe, the axe and the labour of a relatively small group. Seen in this way the systems often appear as admirable and sometimes highly ingenious adaptations to varying environments. This was the approach adopted in Trapnell's masterly survey[1] of the wide range of traditional systems found in Northern Rhodesia, a region in which there is, perhaps, a greater diversity of conditions and cultures than anywhere else in Africa, ranging from the simplest form of small-circle *citemene* to the remarkable permanent agriculture of the Lozi in the complex environment of the Barotse plain. The main factor determining the nature of a system—the extent to which it is a 'shifting' system—is the ratio between the length of time the soil will sustain cultivation and the rest period required for the restoration of fertility. In Africa as elsewhere there are 'permanent' soils which will sustain perennial crops or repeated cultivation of annuals almost indefinitely—such as the alluvial shelves of the Zambesi and other rivers, the fringing soils of the great Barotse plain, the *ouala* lands of Senegal and the strong, deep soils in the eastern regions of recent volcanic disturbance. There are also 'semi-permanent' soils which will recover their fertility after a fallow period no longer than the period of cultivation, provided that cultivation is not unduly prolonged. On such soils one finds systems of permanent cultivation; or, at least, an agriculture that is 'shifting' in a degree not much greater than the 'shift' from arable to ley on a well-managed farm. At the other extreme, there are weak, leached soils of the ancient plateaux which may require, under natural conditions, twenty years or more to regain their fertility after two or three years of cultivation. These might well be called 'shifting cultivation' soils, since they impose an extensive spatial movement of the cultivated land—and an accompanying shift of habitation as a matter of convenience if not of necessity. Between these extremes one may find an almost complete range of gradations,

so that it is virtually impossible to say where 'shifting' cultivation begins and ends. The difficulty of definition is increased by the fact that many systems cover a wide range of environmental conditions, and it is not uncommon to find permanent and shifting use of land within the same system. It has therefore been proposed to drop the term 'shifting cultivation', or to use it only for the more extreme variants, and substitute 'land rotation cultivation'.

SOME EXAMPLES OF TRADITIONAL SYSTEMS

The Chagga on the moist southern slopes and strong volcanic soils of Kilimanjaro practised what may be described as a permanent form of agriculture. Before coffee planting and pressure of population altered the pattern, the holding of a family consisted typically of two parts, the *kihamba* and *shamba*. The *kihamba* included the homestead and a surrounding permanent grove of plantains and bananas, while on the *shamba* land short-period arable cultivation alternated with brief natural grass leys which provided fodder for livestock. Manure of cattle and small stock was, and is, carefully conserved and applied to the *kihamba*. This, and surface mulching, maintained a high level of fertility.

Very similar systems of food production developed in other regions of high fertility with climates suitable for plantains and bananas; for example, on the southern and western slopes of the Mount Elgon Massif, where the Gishu practise a system hardly distinguishable from that of the Chagga, and in Buganda.

Permanent cultivation. A Chagga plantain grove with underplanted coffee

There are environments and systems of high human carrying capacity, capable of supporting on a subsistence basis population densities of 500 or 600 per square mile or more.

The climatic zone suited to plantains and bananas extends westwards across the equatorial forest region; but on the weak, leached soils of the Congo basin they are not perennial crops. The system of the Bakumu in the Province Orientale is to clear the forest and plant a first crop of maize followed by upland rice on the same land. Thus, two grain crops are taken in the first year and they are interplanted with plantains, bananas and cassava which mature and are harvested in the second and third years. Thereafter the land is left to regenerate under secondary forest. Return to the forest climax would probably require 150 to 200 years, but soil fertility is regained under secondary growth in a much shorter period, commonly 12 to 15 years according to the research workers of L'INEAC.*

In this environment the requirement of cultivable land is obviously much greater and the proportion of such land is very considerably less. Failure to appreciate the importance of this factor, the proportion of a land area which is cultivable within the limitations of a traditional system, has frequently led to grave errors in land planning and settlement schemes and the demarcation of African Reserves. In parts of the Congo forest one comes across the deserted remnants of some of the earlier *paysannat* settlements which failed and were abandoned because they had been demarcated on unsuitable soils.

The equatorial forest basin may be capable of supporting a general population density of the order of 50 or 60 per square mile, on a basis of subsistence and petty commodity production; but actual densities are generally far below this level. The general population densities in the Province Orientale and the Province Equateur are 12 and 10 per square mile respectively, and these figures include considerable urban populations. Under such circumstances of abundant land one finds what may be called true shifting cultivation systems; movement of peoples from one area of forest to another at will rather than in accordance with the strict requirements of the cultivation and fallow cycles. This situation has influenced the Belgian approach to land problems. Their policy of *paysannats indigènes* aims at the control of the traditional systems, so as to achieve greater stability and facilitate economic and social development within the existing framework, and excludes revolutionary changes. In the Mandate of Ruanda-Urundi, however, they are faced with problems of over-population and over-stocking such as are all too familiar in other parts of Africa.

In the savannah and dry woodland regions of sudanian climate, north and south of the forest belt, agriculture is handicapped by short and often uncertain rains and long seasons of complete aridity. The capacity of the land to support human populations is generally lower than in the regions of equatorial climate and relatively abundant bi-nodal rainfall, but the variations of environments and systems is so great that one cannot single out two or three examples as typical. I will mention one system of north-eastern Ghana, practised by Fra Fra, Kusasi and other tribes, not because it is typical but because it shows certain

* L'Institut National pour L'Étude Agronomique du Congo Belge.

'Shifting' cultivation. A Mambwe 'large circle' citemene *garden*

unusual and puzzling features. This is a concentric ring system. The permanently-cultivated 'compound' farms surrounding individual family homesteads show three clearly-defined concentric rings; a very narrow inner ring of high fertility, heavily and continuously fertilized with cattle and small stock manure, night soil and household refuse; a second much wider ring manured less frequently and an outer ring which gets only very occasional light dressings. The sequence of crop associations varies on each ring according to fertility. In addition to the 'compound' farm, each family generally has 'bush gardens' which are worked on the more usual pattern of alternate cropping and rest. Population densities are high, ranging from 200 to 900 per square mile, and the region presents some of the most depressing spectacles of land degeneration and human poverty to be seen in Africa.

This 'concentric ring' agriculture has been described as a 'primitive form of permanent farming'. I doubt if it was ever anything of the sort. Further east, in the Chad Territory, one finds very similar systems—described by Dumont[2]—under conditions of low general population density. Here the whole community moves to a fresh site as soon as the soil becomes impoverished. The use of manure does not make the system permanent, because it cannot be applied in sufficient quantity over a large enough area; it merely reduces the frequency of movement. This is another form of true shifting cultivation which may have originated because people had to group closely together for defence. Very probably, the agriculture of north-eastern Ghana was a shifting cultivation system of this type which has become 'fossilized' through inability to move.

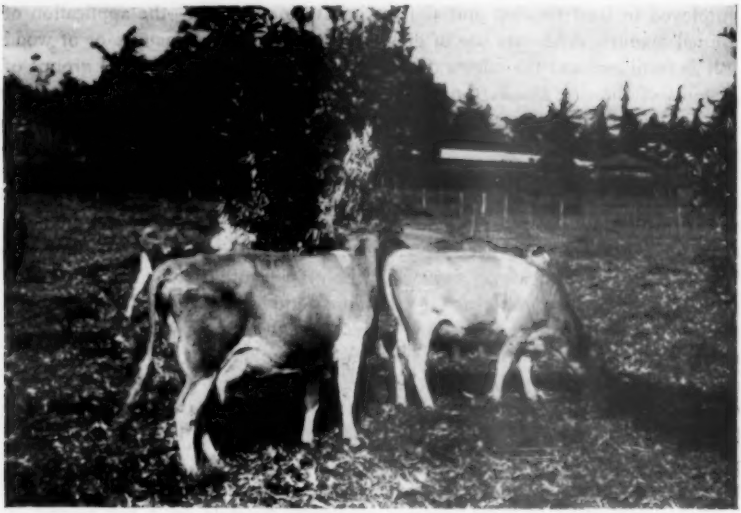
Devices for increasing and prolonging soil fertility are quite commonly employed in land rotation and shifting cultivation systems—the application of animal manure, deliberate use of grass and weeds as green manure or of wood ash as fertilizer, and the effects of heat. One of the most remarkable groups of systems of the dry *Brachystegia Julbernardia* woodland in the south is known by the Bemba name *citemene*. These systems are practised by a number of tribes inhabiting the Congo-Zambesi watershed, mainly in north-eastern Rhodesia. Large areas of woodland are felled or lopped each year, the branchwood is stacked and burned and the ash gardens sown with finger millet. In the simpler variants the ash gardens take the form of a great number of small circular patches scattered throughout the felled woodland and these are used for only one year, with the exception of a very few which may be planted with groundbeans or groundnuts in the second year. In the more complex systems, lopped branchwood is piled over an area of about an acre and the large ash garden is fenced against the depradations of animals and used for a sequence of cropping extending over three to five years, but fresh *citemene* gardens are made for finger millet each year. In this way high and reliable yields are obtained from soils of very low intrinsic fertility. The main effect is from the intense heat of the burn—which may operate by releasing nitrogen, or so recent soil work suggests—but the fertilizer value of the ash is also very considerable.

The continuation of these systems obviously depends on a full period of woodland regeneration, which may be 20 to 30 years after lopping or felling, and the land requirement is very high. The population densities they can support vary from 4 to 12—or, perhaps 15—per square mile. These figures are rough estimates of *Critical Population Densities* for the *citemene* systems in the environments in which they are practised.

'CRITICAL' POPULATION DENSITIES

The factor I have called Critical Population Density may be defined, *for a given system and environment*, as the greatest density the system will support in perpetuity without damage to the land. If this density is exceeded a process of land degeneration and declining fertility sets in—normally soil degeneration, but, in the case of *citemene* systems, degeneration of the woodland—*unless there is a compensating change in the system.* The factors involved, the difficulties of estimation and examples of the application of the concept to a range of Northern Rhodesia systems and environments are described in a paper I wrote thirteen years ago[3] and in the works of Peters[4].

It is rarely possible to arrive at more than a rough approximation, but even this may be of value, and the concept of Critical Population Density is of some help in understanding the traditional systems of land use and the effect of change. The range, from environments of very low to environments of very high potential, is great; probably from about 4 people per square mile at the one extreme to 800 or even 1,000 at the other. Thus, crude population densities alone have little meaning, while critical in relation to actual population densities give some measure of the degree of pressure on the land. A general population



Planned farming in Kenya: established pasture on a Kikuyu farm. This is well balanced mixed farming

density of 20 people per square mile in the small-circle *citemene* area of the Serenje highlands represents a much greater degree of pressure than 1,000 per square mile in the plantain-growing region of Chaggaland.

CHANGES IN THE TRADITIONAL SYSTEMS

The traditional systems were not static. They changed slowly or rapidly under the influence of each other or in response to population pressure or the acquisition of new crops. The introduction and spread of crops from South America—and earlier introductions from Asia—must have worked something like a revolution in African agriculture long before Europeans or Arabs had penetrated beyond the coastal fringes of the continent. Migration and the harsher machinery of war, pestilence and famine maintained, in general, a rough and fluctuating balance between people and land. But sometimes communities were confined to very limited areas, by increasing aridity or the action of enemies, and they responded to the challenge of growing population pressure by evolving intensive land-use systems of high carrying capacity. There are many surviving examples; the Matengo pit system of the Livingstone Mountains, the intensive cultivation of the Gishu on the higher slopes of Mount Elgon and the Mandara hill people of Nigeria, and the 'truly glorious' agriculture of the Jebel Marra in the Sudan, as an enthusiastic Agricultural Officer describes it. Perhaps the most remarkable example of all is a little island in Lake Victoria, about the size of Guernsey, where

Irrigated farming in the Sabi Valley. Arable land in a high state of fertility, but common grazing heavily over-stocked

the Wakara people have evolved an almost incredibly intensive system which makes use of nearly every device known to agricultural science—except, of course, artificial fertilizers and mechanization. But every system has its population limit. However intensive it may be, and though a man spends all his daylight hours in labour, there comes a point when the land is too small to give even a bare subsistence in return. On Ukara island the breaking point seems to have come at a population density of about 550 per square mile.

EFFECTS OF EUROPEAN INTERVENTION

The effect of the European intervention in Africa was to release forces and to introduce new ethical and economic values—usually irreconcilable with the old—which acted on the traditional systems of land use and tenure both directly and indirectly. The drawing of political boundaries and the establishment of European administrations disrupted the old mechanism of movement and adjustment. Some communities, like the Ngoni of Northern Rhodesia and the tribes of north-eastern Ghana, found themselves 'stabilized' and contained at population densities well above the critical level; others were released from a similar situation. In either case the result was, almost invariably, deterioration of the land and lowering of standards of agriculture. The part of the Ngoni lands that has not been relieved by re-settlement is now known, with justice, as the 'devastated area' and the overpopulated regions of northern Ghana merit a similar description. The Wakara who leave their island for the mainland and the Bagishu and Matengo

who come down from their mountain slopes do not bring with them the intensive but highly laborious practices of their home areas; they are content with lower standards and an easier life.

The cessation of wars and slave trading, greater security of life and restriction of practices which tended to limit population growth created a climate favourable to increase rates greater than in the past, and to this has been added control of epidemic diseases of humans and livestock, medical services increasingly available to Africans and relief from famine—all leading to an upward surge of population. There is a good deal of controversy about the rates at which African populations are increasing—the demographic data are miserably inadequate and unreliable—but the evidence for a considerable general increase, and startling increases accompanied by development of intense pressure on the land in many areas, is overwhelming. Even this may be only a prelude to an explosion of population.

A third change-producing factor of the greatest importance was the new and revolutionary idea of a money economy which developed with the introduction and extension of cash crops, the growth of markets for labour, increasing cash needs for education, taxation and other purposes, and desire for the manufactured goods of Europe. Many land-use systems were not affected by the process of political stabilization and have not yet been disrupted by population growth, but very few have not been touched and altered by the tentacles of the money economy. Where cash crops have not been successful, or have not been introduced, the need for money is commonly met from the wages of migrant labour. Many of the food-production systems have degenerated in some degree as a result of withdrawal of the most active sector of the labour force, leaving behind women and children, the aged and the weak.

Many other factors have also had an effect; alienation of land for European settlement, the example of European farmers, the introduction of the plough, the patient and admirable efforts of Agricultural Officers and other agents of improvement; but the influences which have acted most decisively on the systems of land-use—at least between the Zambesi and the Sahara—arise from the money economy and the increase of populations, in terms not only of natural increase but of concentration in areas of economic opportunity and relative wealth.

CASH CROPS

Some thirty years ago it was generally thought that development of cash crops alone would revolutionize African agriculture and most of the resources of the nascent Agricultural Departments were devoted to this end and to problems of processing and marketing. The conditions of the time provided neither the money nor the outlook for large-scale State participation in land planning and development. The new crops were simply superimposed upon the existing agricultural systems and agrarian structures.

The effect of the general adoption of a cash crop, such as cotton, is to increase the land requirement and lower the critical population density of the system on which it is imposed, if there is no compensating improvement of techniques.

It was inevitable that efforts to establish cotton should be most intense and their success greatest in the more accessible regions of high population density. Frequently, but by no means invariably, these densities were approaching or had reached the critical point and the result was to upset the population-land balance or accentuate problems already latent.

A permanent cash crop such as coffee has less effect on the population–land balance, since the additional land requirement is lower than that of an annual crop grown under a system of land rotation cultivation. In regions of permanent plantain and banana culture, where coffee is underplanted to the main food crop, the land requirement is hardly increased at all. This underplanting is undesirable from the point of view of coffee cultivation but it has the advantage that a family can obtain adequate food and a cash income from a very few acres of land. Where permanent cash crops are combined with land rotation systems of food production the situation is, however, somewhat different. Kobben[5] has described the effect of such a combination on the agriculture of the Bete and Dida of the Ivory Coast. Here conditions allow of only two years cultivation—to rice, taro, plantains, yarns and cassava—after which a rest period of about six years is required to restore soil fertility for arable cropping. Land is now commonly put into coffee—and, to a much smaller extent, cocoa—after food cropping, and the continuation of this process, combined with settlement of villages along motor roads and immoderate sales of land to immigrant coffee planters, is resulting in acute land shortage, with the inevitable consequence of a shortening of the fallow period and a decline in food production.

A similar situation may be arising in the cocoa-growing regions of Ghana. The prosperity of Ghana depends upon the relatively small zone of forest ochrosols in the south-west, a region almost ideally suited to the establishment and growth of the cocoa plant. The industry was started by immigrant farmers, Akwapim, Ga, Krobo and others, who had acquired economic experience and capital as a result of contact with the West based on the old trade in oil palm products. They bought land from the Akim on the eastern edge of the forest zone. Population was then well below the critical level, there was much unused forest, and the Akim Chiefs were as eager to sell their lineage lands as the stranger farmers were to buy. Swollen shoot disease has killed the cocoa in the original area of establishment and plantations have spread westward through Ashanti, with a growing preponderance of native farmers. The farmer makes a food garden, interplants cocoa seedlings and repeats the process after one, two or three years, so that he acquires a considerable number of small, scattered plantations. At the low yield levels generally accepted the plantations require little attention other than an occasional slashing of the undergrowth, and the system has more in common with a collecting than a farming economy. Meanwhile, food production moves farther and farther from the towns and villages, and food has to be transported greater and greater distances at increasing cost. The process has not yet reached its logical conclusion, for a considerable reserve of forest still remains; sufficient, it has been estimated, to last another 15 or 20 years at present rates of exploitation.

Salisbury, Southern Rhodesia, a Mecca of migrant labour and a focus of urbanization

In general, the effect of cash crops has been to accentuate population–land problems: by increasing land requirements, creating conditions favourable to rapid growth of population and attracting immigrants to areas of economic opportunity; and there has been no compensating revolution in methods of land use and systems of tenure. On the other hand, where they have been successful, development of cash crops has vastly improved African standards of life, provided the means for social and development services and laid the foundations of future change. In some countries the increase of wealth has been spectacular. The total value of domestic exports from Uganda was £60,000 in 1904; in 1954 it was £42 million, of which cotton accounted for about half and coffee for a good deal of the remainder. Commenting on this development, the Report of the Agricultural Productivity Committee says: 'Western civilization has failed to induce a new outlook towards efficiency and productivity. The changes which have taken place in the last half century, though they appear spectacular in many ways, are only superficial. Traditional attitudes and behaviour in the rural areas are still a major obstacle in the way of technological progress.'[6]

LAND TENURE

Many people now think that the traditional African systems of land tenure are the main barrier to technological progress. There is, of course, no system of tenure common to Africa or any large part of it, but rather a complex of patterns which evolved under different historical and political circumstances. The land-holding unit is, very often, a lineage, but there are also feudal systems with landlords and tenants, societies in which chiefs exercise control over land alloca-

tion so that there is a descending hierarchy of 'estates of holding', and others in which the individual acquires land rights by residence in a particular village community or neighbourhood. Yet, within these different frameworks, one finds much the same ultimate content of individual rights. The person who needs land has an indefeasible claim to it by right of descent or residence or recognition of a political superior. He owns rights to the use of land, not the land itself; but in most societies he may transfer these rights to another, within the limits of traditional rules, either by loan or gift, and in some societies he may transfer them for a material consideration. Sales of land between Africans is not, therefore, a very revolutionary change. It might be regarded as a development of the traditional mechanism of transfer of rights adapted to the money economy.

One of the most striking changes of recent years is the extent to which land has become a saleable commodity. As one would expect, the change is most marked in regions of continuous cultivation and permanent cash crops. The establishment of a crop such as coffee confers an immediate economic value in the land and the planter comes to regard the land as his. Where annual cash crops are grown, sales of land do not, as a rule, arise until land shortage has become acute, but such transactions are becoming increasingly common in some areas; for example, south Teso in Uganda, Sukumuland in Tanganyika, Ukara island, and among the Tonga of Northern Rhodesia where resistance to the change is expressed in the fiction that what is sold is not the land but the 'improvement'.

Density of population in relation to land needs, forms of production and techniques, political and social institutions all affect land tenure to the extent that they affect the relative scarcity or abundance of land. Relative scarcity results in a diminution of the authority of the traditional controllers of land, lineages, estate holders or political authorities; and a strengthening and consolidation of the rights of individual cultivators. Father-son inheritance is tending to replace the old rules of succession to land, and a demand for testimentary disposition of holdings is becoming increasingly apparent. The logical end point of these trends is private ownership of land by the cultivator, a point which has virtually been reached through the unaided processes of change in Chaggaland.

In the Kikuyu lands of Kenya private ownership with registration of title has been successfully introduced following land consolidation; an achievement made possible by conditions arising from the Mau Mau emergency; the destruction of the tribal social and agrarian systems and the availability of resources and powers of intervention that would otherwise have been lacking. Magnificent work has been done in consolidating fragmented holdings, farm planning and the rehabilitation of the Kikuyu lands. The standard of land use on the planned farms is remarkably high; but it would be a mistake to regard this as a model which can be readily and generally applied, or to speak of an 'agrarian revolution' in East Africa. The farmers are still a small minority and there is little evidence of technical progress on the great mass of small, often miserably small, land holdings.

A 'migrant labour' village in Northern Rhodesia. Seventy per cent of the men are away at work

The emergence of a new social and economic class of farmers is not confined to Kenya. One finds excellent examples of African farming in other countries also; for example, in Northern Rhodesia, among the 'Master Farmers' of Southern Rhodesia and Nyasaland and on many settlement and land reclamation schemes throughout Africa.

The Land Husbandry Act of Southern Rhodesia seeks to bring about a more complete agrarian revolution by the rapid substitution of peasant farming for tribal agriculture and stock-raising throughout the African Reserves. A good deal of progress has been made, but it is as yet far from certain that a stable and viable rural society will result. It has been estimated that the successful completion of these land reforms will mean the immediate creation of a landless population of half a million which will be added to at an increasing rate, initially about 20,000 a year. Will economic expansion provide adequate employment for a growing army of unskilled workers and security comparable with that of the old order? Or will a backwash of population pressure on the land break down the new rural structure as fast as it is created?

The history of Keiskammahoek settlement in South Africa provides a classic example of such a breakdown. Almost a century ago the experiment of settling Xhosa people on freehold land was started. The farms were of a fair size, averaging 40 acres, with additional grazing on village commonage. To-day these freehold farms are barely distinguishable from the tribal lands of the Reserve. Population densities are almost equally high on freehold and tribal land, and standards of

productivity have fallen to the same wretched level. Most of the farms are still held in the name of a descendant of the original owner but they have, in practice if not on paper, become intensely subdivided among lineage members, while other landless families have settled as squatters on the grazing land. Other forms of tenure, quitrent with legal provision for prevention of subdivision and modifications of the traditional pattern, were also tried with no better results. Every area, irrespective of the type of tenure, has become a rural slum in which no family is self-supporting from the land and all depend to a greater or less extent on the wages of labour.

THE FUTURE?

This has happened because land is still a basic need and the old right of every elementary family to the use of land survives here, as it does throughout most of Africa. This need and the right to its fulfilment have proved stronger than legal provisions and sanctions and the 'enlightened self interest' that was to replace the old values. Few men would dream of turning destitute kinsmen off their land or refusing help to a needy brother: to do so would be regarded as conduct immoral in the highest degree.

It is easy to place the blame for this situation on the irrational survival of outworn customs and attitudes, but if we look a little further we may conclude that the persistence of these customs and attitudes is due to the failure, so far, of the new economics to provide a stable and permanent way of life as an alternative to the old reliance on the land. The technical problems of agriculture are relatively simple, compared to the complex of social and economic dilemmas in which they are set.

Agricultural progress and industrial development, in the widest sense, are locked together in a Laocoon-like embrace. One must go with the other. Advanced agriculture, on anything like a general scale, is only possible within the framework of an advanced economy and social institutions. This wider aspect of the problem is receiving increasing practical recognition, most noticeably, perhaps, in the Belgian Congo, where the *Office des Citiés Africaines* has done some most impressive work in the last five or six years. It appears also to dominate the thinking of the new African political leaders, or those of them with whom I have spoken. They envisage a complete reconstitution of the economics of their countries, on the model of the West, and they look to outside capital and skill as a means to this end.

The need for every scrap of aid that can be given to the emergent African democracies is very evident—for capital investment in industry and the generation of power, for land reclamation and development, for education and the needs of the universities and colleges that will mould the character and thought of the new Africa. The dark continent of my childhood has become a testing ground not only of democracy under African leadership but of the wisdom of the West.

Yet there are many imponderables and it is fitting that I should end with a question mark.

Which is a picture of the land pattern of the future—Keiskammahoek or the Kikuyu farms?

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DISCUSSION

DR. GRAHAM WHITE: Is it not a fact that in Southern Rhodesia examples of bad use of native purchase areas are unusual, and that generally the boys do look after the land properly because it is their own?

THE LECTURER: The answer is yes and no. The policy in regard to these native purchase areas has been changed fairly recently. Previously any African could take up land in the native purchase areas, and I should say that of those who took up land under these conditions and over that period the majority farmed their land badly. In recent years a certain standard of agricultural achievement has been required before granting this land on freehold title. The general requirement now is that any African who takes up land in these areas should be a 'Master Farmer', and these later people who have come in with such qualification, or with several years experience of farming of a high standard, are farming reasonably well and some of them very well indeed—practically up to the standards of the Kikuyu farms, making allowance for the much poorer environment in Southern Rhodesia. So I should answer your question by saying that the majority of the older people farmed badly, but the majority of the newer people who have come in the last four or five years are farming well.

MR. GORELL BARNES (Colonial Office): Among the most striking contrasts in the pictures Mr. Allan showed us was, on the one hand the paddock grazing on a Kikuyu ranch in Kenya, and on the other, the eroded grazing on Southern Rhodesian planned farms. Does he attribute this contrast to the worse soil in Southern Rhodesia? Or to the fact that grazing there is communally-owned, I understand (though the arable land is held on individual tenure), whereas in Kenya the grazing is included in the individual pattern?

THE LECTURER: Yes, that is a fundamental difference between the two improved systems. In Kenya the farms have grazing areas whereby pasture is established, and any cattle which the farmer has must in theory be kept on his farm and in that grazing area. Now this differs radically from the Southern Rhodesian system, where the cattle are all kept on common range; and that is the main reason for the difference between the state of the grazing on the Kikuyu farms and the land bordering the irrigation scheme which I showed you. The other reason is climatic. It is very much easier to establish and to maintain grass in these highly fertile and well-endowed climatic regions of Kenya, than to establish and preserve grass in the more arid conditions of Southern Rhodesia. Furthermore, of course, the cattle-carrying capacity of these beautiful Kenya pastures is very much higher than that of Southern Rhodesia. On these Kenya grasses you can carry a beast to the acre; on some of that dry land of Southern Rhodesia you need twenty acres, thirty, maybe even forty. So you have both these factors, the difference between the cattle on the farm and on common range grassing, and the difference between the climate of the two regions.

The Lecturer was then asked how he arrived at the figure of half a million cultivators said to have been displaced by the Land Husbandry Act in Southern Rhodesia, since the

African population there was only two and a half million, including men, women and children, and it was doubtful whether there were even half a million African cultivators all-told in existence in Southern Rhodesia to-day.

THE LECTURER: I got the figure from a lecturer from Southern Rhodesia, whose lecture I attended the other day in Manchester. I have not had time to check it myself yet.

[*The Lecturer has since contributed the following note on this point:*

This figure was given to the Southern Rhodesia Parliament by Mr. H. J. Quinton, Parliamentary Secretary to the Ministry of Native Affairs, on 20th October, 1959. 'There were', he said, 'More than 500,000 Africans in Southern Rhodesia who were entitled to land under the Land Husbandry Act but had no land available to them under the present system of assessment.

'The number of people entitled to land under the Land Husbandry Act had been established at 307,000 families (a family being regarded as 5 or 6 people). However, arising out of the assessment of the land available, it was found that only 205,000 families could receive a standard holding, leaving 102,000 entitled to land and yet having no land available for them on the present method of assessment'. (*Rhodesia Herald*, 21.10.59.)]

SIR ARTHUR KIRBY, K.B.E., C.M.G. (East African Commissioner): May I ask the lecturer what are the governing factors in the improvement of agricultural productivity. Can it be done by rainfall, or fertilizers, or can the land be mulched? There are some sorts of land which might sustain one person to the acre or one person to the square mile; other places which could sustain perhaps a thousand people per square mile. Can those areas which sustain only one person to the square mile be improved so as to sustain many more people? In Tanganyika, which is about 350,000 square miles in area, there are now about nine million people; we are told by agricultural officers that it could sustain 35 million people, which by my calculations would mean roughly about 100 people per square mile. Is that possible?

THE LECTURER: That is a most important question: what can be done to improve the human carrying capacity of these poorer soils? The answer, I think, is that we still do not know enough about the management of African soils, particularly about the management of these poorer soils, to be able to say just what can be done with them. Most of the planned farming work is done on the better soil and we have singularly little information about the poorer soils or how they can be brought up to a higher standard of productivity—at least, we do know generally how you can bring soils up to a higher state of productivity, but the question is, can you do it economically? I think (I am only hazarding a guess) that it will be found that there are a great many of these poorer soils which we cannot do very much with economically. Look at our own conditions here, look at Scotland. What do we do with the heather hills and the bracken hills of Scotland? We do not cultivate them because it would be uneconomic to do so. We use them for sheep farming, and sheep farming supports few people and only pays because half the profit comes from government subsidies. So I myself am not hopeful about being able greatly to improve the human carrying capacity of these very nasty-looking pallid plateau sands that I showed in the pictures. They would, I think, mainly be useful for grazing, for some form of ranching, but there would be a marginal zone of soil with which I think we may be able to do quite a bit.

THE CHAIRMAN: Mr. Allan, you told us that in Leopoldville the Belgians had developed a system of using city refuse for fertilization. I think you said that so far as you knew that was not being done anywhere else. Is there any reason why it should not be done; is that something that we ought to be looking at?

THE LECTURER: I think it is certainly something which we ought to be looking at.

It was quite new to me when I found it in Leopoldville, and I wondered why it is not being done in all the big cities of Africa.

A MEMBER OF THE AUDIENCE: Is it not being done in Kano in Northern Nigeria?

THE LECTURER: It may be. Leopoldville is the one example I have seen for myself.

A MEMBER OF THE AUDIENCE: Referring to what Mr. Allan has said about these poorer soils, is it not true that little has yet been done to see how they can be improved?

THE LECTURER: Yes. The main difficulty in the past has been lack of trained staff and lack of funds. That situation has improved a good deal recently, but the examination of soils takes quite a long time. It is not a thing you can do just by analysing a soil and by looking at the results. You can tell very little by that unless it has been connected with the crop through a series of pilot experiments in the field to let the crop itself analyse the soil. These experiments take a long time and they have, of course, to be carried out over a great variety of soils, so that most African territories have not yet got enough data from field experiments. The data is gradually being accumulated. I quite agree that more could and should be done.

MR. I. IBEGBUNA (Western Nigeria Office): Soil erosion is a basic problem in Africa, and particularly in some parts of Nigeria. I do not know if the lecturer can tell us how to tackle the problem of erosion on plateau land.

THE LECTURER: Another extremely important question—but to answer it fully I would need to give you another lecture about erosion. Erosion is a symptom; when you have erosion it generally means that your agricultural systems have advanced a long way in this path of degeneration. This has happened in a good many parts of Africa, and in one part where I myself worked—the Tonga country of Northern Rhodesia—when this stage of erosion was reached we treated the land against erosion by putting in gradual countour banks on a large scale; that you can always do, and that is one answer to your erosion problem. You may not improve the fertility of the soil by doing so, but at least you stop it disappearing entirely. What happens when the rest period is reduced until it has practically disappeared is that the yields of your crops fall down to a base level and then flatten out, and they will stay at this level until the soil is destroyed by erosion. But you can stop the drop going any further by putting in anti-erosion works—either terraces or contour ridges on the true contour and so on, it all depends on your topography and conditions. If you have enough money and staff you can tackle the erosion problem, but you must remember that you are really treating a symptom rather than the 'disease' itself.

THE CHAIRMAN: May we thank you Mr. Allan, not only for the lecture and the slides, but for the very resourceful and helpful way in which you have dealt with the questions. I ask you to signify your appreciation to Mr. Allan in the usual way.

The vote of thanks to the Lecturer was carried with acclamation.

SIR HILARY BLOOD, G.B.E., K.C.M.G. (Chairman, Commonwealth Section Committee): May I ask you to join me in a vote of thanks to our Chairman? Sir Hilton is himself a Fellow of the Society, and therefore we are very glad to see him here. Some five years ago he himself read a paper in this room, a paper of such distinction that he was awarded a medal by the Society. I think that method of graduating from the lectern to the episcopal throne, so to speak, will commend itself to you; but above all we should like to thank him because we realize the enormous pressure under which everybody in the Colonial Office works particularly in these modern days. Think of the succession of Conferences at Lancaster House; they seem to follow each other as quickly as the taxis in Piccadilly; in fact, I wonder they have time to change the sheets between the departure of one lot of tenants and the arrival of the incoming ones—the blotting sheets, I mean. May I recall also the visits which are

constantly being paid by the Secretary of State and his political colleagues and the permanent staff of the Colonial Office to the various parts of the dependent empire? The Secretary of State himself, as you know, has recently been away, Mr. Julian Amery is away—in fact, Mr. Amery probably must be lost—I presume he is qualifying by residence to be one of the first citizens of the new Cyprus Republic!

We are so very grateful to Sir Hilton for finding the time to come here and preside at Mr. Allan's admirable lecture.

The vote of thanks to the Chairman was carried with acclamation, and the meeting then ended.

GENERAL NOTES

'RESEARCH' ESSAY COMPETITIONS

For the eighth year in succession the periodical *Research* is sponsoring an essay competition for the award of the Waverley Gold Medal. This competition is designed to encourage 'the scientist in the laboratory and the engineer in the production plant' to translate his work into an essay that will be readily understood by other scientists, directors of industrial firms and those interested in science and technology. The gold medal, and a prize of £100, will be awarded for the best essay of about 3,000 words describing a new scientific project or practical development, and giving an outline of its scientific background, experimental results and potential application in industry. Two additional prizes, of £50 each, are offered.

Research is also introducing a new 'application in industry' essay competition for 1960, with the purpose of drawing attention to the problems encountered when applying scientific developments to industrial problems. Candidates for this award must be practising scientists under the age of 30. They are invited to write an essay of some 5,000 words on any new idea, concept, or experimental result put forward in recognized scientific literature during the last two years, and discuss its commercial exploitation in the next decade. A first prize of £50, and a second prize of £30, are offered.

Further details of these two competitions should be obtained from the Editor of *Research* at 4–5 Bell Yard, London, W.C.2.

SUMMER EXHIBITIONS AT KENWOOD

There are two exhibitions to be seen by visitors to the Iveagh Bequest, Kenwood, during the summer months. One consists of outstanding examples of antique and modern silver from the collection of the Worshipful Company of Goldsmiths, including two famous pieces—the Gibbon Salt Cellar of 1576 and the Rogers Salt Cellar of 1601. Demonstrations of silversmithing are being given throughout the period of this exhibition.

The other exhibition is devoted to the works of Francis Hayman (1708–76), a painter of varied gifts who assisted in the formation both of the Society of Artists (he became its President) and of the Royal Academy. Hayman was also a member of the Society of Arts, and it was he who made the approach which resulted in the holding of the first exhibition of contemporary British painting in 1760, recently commemorated in the Society's House (*Journal*, April, 1960, p. 369). Amongst the portraits by Hayman now on show at Kenwood is *David Garrick as Richard III*, which was also listed in the catalogue of the 1760 exhibition. In addition to portraits and theatrical scenes, the present assembly of a group of Hayman's conversation pieces in landscape settings will revive, and possibly satisfy, conjecture about the extent of his influence on Gainsborough—an influence which has been particularly remarked in the latter's painting of *Mr. and Mrs. Andrews*, recently acquired for the National Gallery.

Both Kenwood exhibitions will remain on view, free of charge, until 2nd October. The Iveagh Bequest is reached from Hampstead Lane, N.W.3.

EXHIBITION OF ENGLISH CHINTZ

An exhibition of 'English printed furnishing fabrics, from their origins to the present day' is being held at the Victoria and Albert Museum until 17th July. Amongst the many interesting items on view are four designs for textiles, dating from 1756–8, which have been lent by this Society from its collection of early prize-winning drawings. They are numbered 10, 11, 12 and 14 in the *catalogue raisonné* of the exhibition, which costs 3*s.* 6*d.* There is a charge of 1*s.* for admission.

THE ARTS OF SUNG

A comprehensive exhibition of the Arts of the Sung Dynasty is on view at the Arts Council Gallery in St. James's Square, S.W.1, until 23rd July. Most of the exhibits have been lent from the private collections of members of the Oriental Ceramic Society (which has organized the display in co-operation with the Arts Council), but museums and art galleries in this country, on the Continent and in the United States have also contributed; as has the King of Sweden, who is patron of the Society.

There is a charge of 1*s.* 6*d.* for admission to the exhibition, and the hours of opening are as follows: Mondays, Wednesdays, Fridays, 10 a.m. to 6 p.m.; Tuesdays, Thursdays, 10 a.m. to 8 p.m.

STUDIES IN THE SOCIETY'S ARCHIVES XII

Dr. Peter Templeman and His Appointment as Secretary of the Society in 1760 (ii)*

The decision to appoint a Secretary of the Society of Arts was taken in 1760, and at a meeting of the Society on 20th February it was ordered to advertise the post and the closing date for the receipt of applications was fixed for 2nd March.[1] Peter Templeman's application, dated 11th March, was therefore late. Nevertheless, it was considered with the others and, as we know, Dr. Templeman was selected as the successful candidate and appointed Secretary of the Society on 25th March.

There were three other applicants, and Oliver Goldsmith also had seriously considered applying for the post.[2] The three others besides Templeman were: Robert Dossie, chemist and author of a treatise on agriculture, a protégé of Dr. Johnson, and later to become a very active and useful member of the Society;[3] Dr. Mitchell, perhaps John Mitchell, a Leyden student of an earlier period than Templeman's who had resided for some time in America and had written *On the Preparation and Use of various kinds of Potash*, which was a subject of special interest to the Society; and thirdly, and perhaps rather surprisingly, Dr. Matthew Maty, Keeper of Printed Books in the British Museum, who has already been mentioned as an associate of Templeman.

Maty addressed himself to the Duke of Newcastle;[4] his letter is dated 1st March, 1760. Templeman wrote direct to the President, Vice-Presidents, and the rest of the Members of the Society on 11th March. The terms of their applications are of some interest for the light they throw on the duties of their offices at the British Museum as seen by two of the first occupants of these posts.

Maty, after a suitable preamble requesting the favour of the Duke's vote and interest, adds the following postscript:

> P.S. Permit me to observe that my employment in the Museum so far from affording a reasonable objection against me that on the contrary the opportunity

*The first part of this article appeared in the May issue of the *Journal*.

Dr. Peter Templeman, by Richard Cosway. (This portrait, which now hangs in the Secretary's office, was given to the Society in 1797, thanks to the good offices of Caleb Whitefoord, a prominent member, and subsequently a Vice-President, of the Society)

it gives me of consulting a numerous Library of Books in every language and on every Subject intrusted to my care, and especially several hundred volumes of Prints and Drawings, dried Plants, etc. collected for the noblest purposes by the late Possessor, might sometimes enable me to furnish useful hints relative to the business of the Society. My conduct, I hope, has hitherto been such as to leave no doubt of my inclination to fulfil my engagements, and the hours of attendance in both places are generally so different that there can be no necessity of my neglecting either.

Compare with this the application of Peter Templeman and his description of his duties, which appear to have been much more those of a librarian attendant than of a Keeper of a Department or of an Assistant Librarian. His application is quoted below in full. It is preserved in the Archives of the Society.[5] It will be noted that there is in his application no reference to the hours of attendance required of him. He wrote:

GENTLEMEN,

I beg leave to offer myself as a Petitioner for the honourable Employment of

principal Secretary to your Society for the encouragement of Arts, Manufactures, and Commerce; a Society that spreads a Lustre on the Age and Country, must necessarily be productive of the greatest advantages to Mankind in all branches of Trade, and give a constant Superiority to this Nation in Arts as well as Arms.

I own I have such an ambition to be the Secretary of so illustrious a Body, as to be willing to sacrifice every other consideration to acquire that Honour.

The Post I hold at present in the British Museum is of such a Nature that I think not incompatible with the business of your Society: my only employment *there* is to send for such Books, Manuscripts, and Curiosities, as the Gentlemen, who are permitted to come thither to study, shall have occasion for; and to take care that they do no injury to them. My time and thoughts may be employed on what I think proper, and can be on nothing so agreeable to Myself as the useful Designs of Your Society. I thought it right to be thus explicit in the nature of my Office at the *Museum* to show that the two occupations are not inconsistent, but if you shall think otherwise, I shall submit myself entirely to your judgments; humbly assuring you that, if I have the happiness to obtain your favour, the most grateful Sense of the Obligation shall be constantly shown by a strict Attention to the Duties of the Office, and by my utmost Endeavours to promote the glorious views of Your illustrious Society.

I am,
Gentlemen,
your most devoted
humble Servant,
PETR. TEMPLEMAN

March 11th, 1760

Both Templeman and Maty evidently felt quite able to discharge the duties of the Secretary to the Society without detracting from the value of their work, or interfering with their duties, at the British Museum. In the case of Maty this is understandable for it appears that the Officers were only bound to attend for two six-hour days in the week, of which four hours daily would be taken up in conducting the very strictly limited number of ticket-holding visitors through their Departments. In the 1760s several of the Keepers had chaplaincies or curacies, and Penneck, who succeeded Templeman as Keeper of the Reading Room, was at about the same time incumbent of St. John's, Horsley Down, and of Abinger, Surrey. However, Templeman's position was very different, for he was required to be on duty for six hours continuously every day when the Museum was open, and it was on this question that he soon found himself in strong disagreement with the Trustees and, one supposes, with Gowin Knight, the Principal Librarian, too.

The Trustees could not relax their requirement that the Keeper of the Reading Room should be in constant attendance, and to do them justice, one has to admit that their financial resources were probably already severely strained and too limited to allow of the payment of an Assistant Keeper. How strictly they wished to enforce this attendance is illustrated by the story, told both by Winter Jones and by Esdaile[6] in their accounts of the early days of the Reading Room, of how Dr. Templeman, while enjoying a walk in the garden, into which he could step through a glass door in the dark, damp Reading Room, was met by one of the Trustees. The Trustee, who remains nameless, 'pointing with his cane to the glass door exclaimed with a startling energy of voice and manner, "Go back, Sir!" '

Templeman had been appointed Secretary of the Society on 25th March. On 3rd May a report from the Standing Committee was laid before the General Meeting of the Trustees of the Museum[7] to the effect that Dr. Templeman is 'lately possessed

of an Office at the Society of Arts and Commerce, which has sometime occasioned his absence from his Duty of attendance at the Museum. . . .' No further official action appears to have been taken during the summer, but from the early days of his appointment the Keeper of the Reading Room had been ordered to make regular monthly reports to the Trustees, and it appears that he was now requested to report the hours of any absence from duty.

The matter came to a head at the General Meeting of the Trustees on 18th December, 1760, when the following report from the Keeper of the Reading Room (i.e., Dr. Templeman himself) was received.[8]

> October 16, 1760. Dr. Templeman was absent on Monday October 6 three hours, on Tuesday 7 two hours, on Thursday one hour and half, on Friday the same.
>
> Dr. Templeman begs leave to observe that tho' he has been absent so often, it has been owing chiefly to a necessary regard for his health, as he finds the long attendance here required will greatly impair it.

The report having been read, it was resolved that Dr. Templeman 'should be acquainted, that the Committee have no power to dispense with any part of the six hours daily attendance required of him, but they will lay his representation before the General Meeting'.

The General Meeting was the same day and the Minute[9] records that: 'Dr. Templeman being called in acquainted the Trustees that, he could not comply with the rule of attending six hours in the morning in the Reading Room, nor on account of his family, take his turn in the rotation of staying 24 hours in the house, and that therefore he chose to resign his office in the Museum'. The Standing Committee was empowered to accept his resignation 'when he shall deliver one to them duly executed. . .'. That this had been done was reported to the General Committee on the 28th February 1761.[10] His bond was returned to him, and the Reverend Richard Penneck was appointed in his place at the same meeting.

So ended Templeman's short period as Keeper of the Reading Room. That the state of his health had something to do with his absences there can be little doubt—as will be shown later—but one cannot help remarking that on two of the days when he was absent, Monday and Tuesday, 6th and 7th October, 1760, there were held meetings of the Society's Committee of Miscellaneous Matters, which Templeman, as Secretary, would have attended.

(*To be concluded*)

W. CAMPBELL SMITH

1. R.S.A., Society Minutes, 20th Feb., 1760.
2. Sir Henry Trueman Wood, *A History of the Royal Society of Arts*, p. 24.
3. For Robert Dossie, see F. W. Gibbs, 'Robert Dossie (1717–77) and the Society of Arts'. *Annals of Science*, Vol. 7, No. 2 (1951), pp. 149–72.
4. British Museum, Addit. MS. 32903.f.29. The 1st Duke of Newcastle-Under-Lyme had been elected a member of the Society on 15th February, 1755.
5. R.S.A. Loose Archives, A4/35. P. Templeman, 1760.
6. J. Winter Jones in *A List of the books of reference in the Reading Room of the British Museum*, 2nd ed. (revised) (London 1871), p. xii. Also A. Esdaile, *The British Museum Library* (London, 1946), p. 40.
7. B.M. Minutes, G.M. 317.
8. B.M. Minutes, G.M. 336.
9. B.M. Minutes, G.M. 341.
10. B.M. Minutes, G.M. 345.

OBITUARY

We record with regret the deaths of the following three Fellows of the Society:

MISS EVELYN DUNBAR

Miss Evelyn Dunbar (Mrs. R. Folley), the painter and illustrator, who died on 12th May, aged 44, was one of the few women to be appointed an official war artist, in which capacity she concentrated on recording her impressions of women's activities, chiefly with the Land Army.

A Scotswoman, Miss Dunbar was trained at Rochester School of Art, at the Chelsea Polytechnic, and at the Royal College of Art. In 1934, with a group of fellow students from the College, she became engaged upon the task of painting a series of murals for the Hall of Brockley County School, Kent. At the time this was a novel experiment; its success was widely acknowledged, and Miss Dunbar's work especially admired. Thereafter she enjoyed a steady success as a free-lance painter and illustrator. Except for the war years, however, she lived quietly in the country, cultivating her garden, which provided all her refreshment and much of her inspiration. In 1937 she published, with Cyril Mahoney (her former teacher at the Royal College of Art), a *Gardener's Chronicle*.

Miss Dunbar was elected a Fellow of the Society in 1956.

CAPTAIN J. D. HAGGART

Captain James Dewar Haggart, C.B.E., Provost of Aberfeldy in Perthshire, died on 13th May, aged 86. He was educated at Morrison's Academy, Crieff, and as a young man entered the business of P. & J. Haggart, manufacturers of tweed and tartan, which had been founded by his grandfather. The firm enjoyed the patronage of the English Royal Family from the days of King Edward VII, and of several ruling houses in Europe and the Far East. Haggart, who reached the rank of Captain whilst serving in the Black Watch during the First World War, was a past President of the Royal Warrant Holders Association, a former member of the Perthshire County Council, and a Justice of the Peace for the County. He was made O.B.E. in 1920, and C.B.E. in 1947. He became a Life Fellow of this Society in 1933.

SIR FRANCIS TERRY

Sir Francis William Terry, who died on 29th May, aged 82, was a director and former chairman of Joseph Terry and Sons Ltd., the manufacturers of chocolate, and a much respected figure in the city and county of York. He was President of the York County Savings Bank, a Past President of the York County Hospital and for several years an alderman of the City Council. In 1945–6 he held the office of High Sheriff for Yorkshire.

Terry was knighted for his public services in 1936. He became a Fellow of the Society in 1951.

NOTES ON BOOKS

THE BANQUET YEARS. *By Roger Shattuck. London, Faber, 1959. 36s net*

The title of this book, combined with the most diverting end-papers—a *fin du siècle* photograph of a school of sages, paunchy and penguin-like, seen in diminishing perspective at a vast Parisian banquet—might suggest something considerably lighter than Mr. Shattuck has in fact undertaken. The Associate Professor of Romance Languages at the University of Texas does, indeed, wear his knowledge easily. But his study of the arts in France from the death of Victor Hugo in 1885 to the year 1918 is essentially a serious contribution to the understanding of *La Belle Epoque* which saw so extraordinary a revolution of aesthetic values. The author quotes the remark made by Charles Péguy in 1913—'The world has changed less since

Jesus Christ than it has in the last thirty years'. The pertinent question is whether all the four men chosen by Mr. Shattuck to illustrate his theme—the painter Henri Rousseau, the composer Erik Satie, the playwright and novelist Alfred Jarry, and the poet Guillaume Apollinaire—were the most influential pioneers in effecting this radical change of attitudes in France.

For all his contacts with leading French painters and critics, the innocent customs official, Henri Rousseau, does appear an isolated figure. The 'father' of French neo-primitive or untaught painters, Le Douanier was an oddity and by no means an influential revolutionary like Picasso and Braque, who together transformed the world of painting with their Cubist vision. Such seeming naïveté and self-confidence as Rousseau possessed have been manifested in previous periods in remote regions of the world, whereas the Cubist explorers following in the wake of Cézanne could only have appeared at their particular moment in France half a century ago.

Even so, Henri Rousseau is unquestionably a fascinating character and the subject of the best study in the book. The author is extremely interested in the manifestations of simplicity, and the problem of Rousseau is whether he was really as ingenuous as he was undoubtedly complacent. We are reminded that at the Saturday gatherings held by Gauguin and the composer William Molnard, the Douanier would move unabashed among such guests as Degas, Strindberg, and Mallarmé. At one of these gatherings in the Rue Vercingétorix, this delightful simpleton chanced to overhear Degas making acid remarks about the difficulties of exhibiting in Paris. The Douanier, in a gesture that staggered the already famous artist, offered to use his 'artistic connections' to 'help' Degas. He was not joking; nor was he anything but in earnest when he once declared to Picasso 'We are the two greatest painters of this era, you in the Egyptian style, I in the modern style'.

Among a multitude of unfamiliar reproductions there are snaps of the Douanier with something of the mien of a Chelsea pensioner, and a number of his paintings to set one wondering again just how guileless was the child-like vision, the tranced air and clarity of those exotic and so endearing scenes. No doubt his personal ambition was to be recognized as an academic artist, though his posthumous fame has been due to the semblance of wide-eyed candour allied to an intuitive technique. The Douanier's body was buried in a pauper's grave in 1910, three years after his friend Jarry.

Of Alfred Jarry the author writes with a mingled irony and relish reminiscent of the tone of Mr. Gaunt's admirable book *The March of the Moderns*. A design by the sculptor Zadkine for a monument to Jarry shows him simultaneously riding a bicycle, pointing a gun, writing in a notebook on the handlebars, and gazing into the sky—the whole thing lit from within, and very suitably commemorating a dedicated eccentric. Of course, there was a method in Jarry's madness, in his fantastic theories of 'Pataphysicks', the science beyond the realm of metaphysics. Indeed his cult of hallucination, which led him to reject all reason, helped to prepare the way for the Dada and Surrealist movements.

At thirty, Jarry was enjoying a unique notoriety in the literary world of Paris, and his ideas were affecting such young writers as Guillaume Apollinaire, André Salmon, and Max Jacob. The essay on Apollinaire lacks perhaps the insight of the others, and the account of his career with episodes such as his innocent involvement in the theft of the Mona Lisa and subsequent imprisonment is over-long in proportion to the rather scrappy estimate of his poetic innovations and remarkable personality. Satie, on the other hand, is dealt with in illuminating detail (Mr. Shattuck has studied music under Nadia Boulanger), and in his summing up the author reveals his own scale of values. 'Greatness', he thinks, 'was not a quality Satie valued, and he was not a great musician. For being singular, for being humble and joyous and wise, both man and work are unforgettable.'

NEVILE WALLIS

RENAISSANCE HANDWRITING. *An Anthology of Italic Scripts. By Alfred Fairbank and Berthold Wolpe. London, Faber, 1960. 63s net*

To admire the italic hand tends in these days to be to practise it too; and it is wholly in keeping with this tendency that the authors of this handsome volume, who have collaborated 'to offer a collection of scripts as one might offer an anthology of poetry', should be an eminent calligrapher and an eminent type-designer. The 96 excellent half-tone plates, illustrating the handiwork of about 70 European writers, are arranged in three groups: 'Manuscripts and Letters', 'Writing Manuals and Writing Masters', and 'Revival of Italic'. The text is composed of an introduction, part-historical, part-technical, by Mr. Fairbank, and an interesting and informative commentary on the plates by Mr. Wolpe, whose hand seems also to be apparent in the distinguished typography. The result of their labours is a book that cannot fail to delight those readers who share the authors' enthusiasm for italic writing.

Mr. Fairbank brings both gusto and authority to his treatment of his subject. His introduction is pleasantly free from the truculence and self-consciousness that mark the published utterances of so many modern apostles of the revival of italic handwriting, but it is the work of a critic who knows his own mind. He does not hesitate to describe as 'Gothic' certain characteristics displayed by the great Palatino himself; and it is clear that both he and Mr. Wolpe regard the silver age of italic as having set in, in the 1570s, with Cresci and Hercolani. Of the Italian masters their own preference is for Arrighi, to whom they plausibly attribute three manuscripts, all illustrated in the plates, which have not previously been identified as his work. (On the other hand they ascribe to 'a secretary' a letter from Giovanni Piccolomini, Archbishop of Siena, which appears from the plate to be holograph.) The authors' natural interest in the practice of italic in England is reflected in the devotion of a section of the introduction to the topic and in the prominence given in the plates to Ascham, Cheke, and Dodington, and their pupils and patrons.

That some of the passages illustrated in this anthology have been reproduced fairly frequently in recent publications is less significant, as an index of the anthologists' tastes and standards, than the fact that about three-quarters of all their examples are drawn from the sixteenth century and that the period between Queen Elizabeth I and William Morris is represented only by a letter of Arabella Stuart, written in 1605, and four blocks from the 1612 writing book of Andres Brun of Saragossa. This suggests that in the authors' view the italic hand ceased more or less suddenly in the early seventeenth century to be written well enough to provide them with examples worth reproducing. Brun's blocks display a hand scarcely to be distinguished from the forty-year-older *bastarda grande llana* of his fellow-countryman Lucas, but in the next half-century italic generally suffered a more drastic transformation than did its successor, the round hand, in the ensuing 300 years. If, as is sometimes suggested, the decay of italic was due to the use of copy-books printed from exuberantly engraved copper plates or to a change in the method of cutting the quill, the modern practitioner may feel that his photographed models and his edged metal pen are adequate safeguards against a second decline; but if, as is also frequently argued, the corrupting influences were a commercially inspired increase in the speed of writing and the introduction of elements from essentially alien contemporary hands, there is a lesson here for the revivalist. And who is better qualified to teach it than Mr. Fairbank?

L. C. HECTOR

EMMA HAMILTON AND SIR WILLIAM. *By Oliver Warner. London, Chatto & Windus, 1960. 25s net*

This is an account of three people, each of whom had 'some measure of genius', and who represented Valour, Taste and Beauty. Sir William Hamilton—one of the avowed purposes of this chronicle is to put Sir William into better focus—whom

George III called his 'foster-brother', was the typical aristocrat, assured, amused, touching life at many points (we possess the accounts of his indefatigable observation of Vesuvius—his 'volcanic experiences'—and of his remarkable collection of classical and other art), notable in charm and 'with qualities of taste and curiosity far beyond those of the normal aristocrat of his own or any other time'. He lived with a purpose and never wasted time; and he made both his wives very happy. 'His mortal span had been crammed with activity and he never made an enemy.' While we may wonder at the continuance of his affection for the equivocal Greville after his nephew's huckstering disposal of Emma to him, the fact is, and it is not quite easy to understand, that people liked Greville, and continue to like him. Hamilton was his uncle, it is true, and Nelson came to like him only gradually, but Emma, though she was in despair when she found out what a trick had been played in sending her to Naples, forgave him, and relied on him thereafter; and there were many others.

In Nelson it is difficult to see the 'artistic unity in character' which Mr. Warner ascribes to him. His adultery was inconsistent with his Belief and with his duty to Lady Nelson; his 'gentle treatment of his men', and his jocular encouragement of a midshipman who was scared to go up the mast, do not square with his writing to Jervis, 'Had it been Christmas Day instead of Sunday, I would have executed them', and with the *Victory*'s having 'the most savage punishment roll in the fleet'. Of the betrayal of the garrisons of Uovo and Nuovo, Admiral Sir William James says, 'It is an unpleasant story. . . . This was bad, but worse was to follow'—the hanging of Caracciolo. Even his strategy has been called in question, and of his tactics at Trafalgar Russell Grenfell says that he 'entered the battle in a manner that was theoretically suicidal'. And yet . . . and yet . . . with his boundless physical courage and his invincible charm. he is irresistible.

But of the three it is Emma for whom one's heart melts. She is sixteen when we first get a hint of what the Right Reverend the Earl of Bristol called 'dearest Emma's Dorick dialect', when her youthful 'giddiness' had brought retribution and she was 'ruined', and in an agony of apprehension: 'What shall I dow? Good God! what shall I dow? I have wrote 7 letters, and no answer . . .O G., what shall I dow? *what shall I dow*?' and she has our sympathy through her rescue by Greville, her sale to Hamilton, their happy life together, the glory she shared with Nelson (she never 'inspired' him, the author says: Nelson would have been Nelson, the admiral, even if he had never met her), and the birth of Horatia and of the second child, her third, who 'disappeared from history', until, after the deaths of Hamilton and Nelson, with no man to control her emotional and financial extravagance, she sank into disintegration and decline. She had always needed a man and, when her 'giddy' time was over, she would be faithful to him. We can discern, all through, her working-class merits of 'resilience, kindliness, sympathy, gaiety, fecklessness, utter lack of inhibition, and a directness equal to that of the aristocracy'. Telling of what she learnt from Nelson, the author says, 'He could not teach her courage, for she had that already'. It does not appear from this book that her last years were so dreadful, even in the cheerless and dreary house at Calais. No doubt she remembered happier things and hope deferred made her heart sick; but she did her best, even to a donkey, for Horatia who, while deploring that she 'took wine and spirits to a fearful degree', said after she died that 'she had many fine qualities which, had she been placed early in better hands, would have made her a very superior woman'. One is glad to think that Horatia lived a happy life with the Matchams till her happy marriage at the age of twenty-two.

HUMPHREY HIGGENS

MATHEMATICAL IDEAS: THEIR NATURE AND USE. *By Jagjit Singh. London, Hutchinson,* 1959. 35*s net*

In the allegoric language of the Bible, the Day of Judgement will see Mankind

divided into sheep and goats. In this twentieth century A.D.—a period which is yet some unspecified time in advance of that Awful Day—should we not be divided into Mathematicians and Non-Mathematicians? After perusing this book, I feel sure that such a division would be no mere allegory and have placed myself in the Non-Mathematical Class, or should I say 'Set', in conformity with the author's language. The publishers say that the object of the book is to show the non-mathematical reader the nature of the ideas with which mathematics deals . . . how even the most abstruse mathematical concepts may enter vitally into the common activities of modern civilized life. It is really most doubtful whether the book does achieve its objective, and I shall refer to this later. For the moment I should like to consider the latter part of the publishers' statement, which is an expression of Man's conceit, albeit an innocent one. Mathematics is basically a language invented to express the laws governing the Universe, which range from explaining such every day phenomena as why soap helps us in our ablutions to the relationship between mass and energy. These laws are not of our making. We talk of Newton's Laws of Gravitation and of Einstein's modifications of these laws, but these two men, giants amongst us, only expressed certain phenomena in this mathematical language. They did not create the phenomena. Quoting from memory, and I hope correctly, Eddington stated 'If there is a God, He is a mathematician'. Casting aside the implied doubt of Eddington's dictum, we should recognize with all humbleness that some mathematical concepts are abstruse solely because of our own limitations. The chief value of this book lies, I believe, in showing how a very few of these limitations have been overcome within the last three thousand years. In other words, how our mathematical vocabulary has grown and is increasing at an ever-increasing rate. Nevertheless, the book is full of disappointments and at times descends to bathos. The concluding sentences of Chapter 2 read: 'The danger of robot machines is not technical, but social. It is not that they will disobey man but that if introduced on a large enough scale, they are liable to lead to widespread unemployment.' By this piece of sophistry, the author places himself among the Luddites and this ill becomes one who later casts doubts on Euclid's axioms.

Even the most cursory glimpses through this book will reveal how wide has been the author's own reading, but the numerous references to ancient scholars of varying degrees of obscurity become somewhat of an irritant and a distraction, aggravated by the prolific use of ugly words such as quantize, econometrics, rigourise, paleotechnic, geometrisation. But enough, I must go back to my doubts on whether the book achieves its objective.

First, I cannot accept the publishers' claim that the author's account of The Calculus, in Chapter 3, is one of the best yet written for the enlightenment of those whose mathematical education stopped short at elementary algebra. Fortunately for me, my mathematical education did continue beyond this stage and I learnt to appreciate the elegance and power of what Silvanus P. Thompson called 'Those beautiful methods of reckoning' in his delightful but heretical little book *Calculus Made Easy*. Jagjit Singh does not make it seem easy or elegant and leads us up many alleys which can only be blind to those of us who are non-mathematical. What is the value of talking about, as on page 57, 'Kopal's paradoxes, paradoxes of airfoil [*sic*] theory, the reversibility paradox, the rising bubble paradox, the paradox of turbulence in pipes, Stokes' paradox, the Eiffel paradox, the Earnshaw paradox, the Du Buat paradox, etc.'? My guess is none at all, particularly in a chapter written ostensibly to explain the Calculus. In any case, are not such paradoxes more apparent than real merely because our mathematical vocabulary is limited? Later the author says, 'To begin with, let us take viscosity' and I prepared myself to 'take it', only to find myself wondering a few minutes afterwards what on earth 'An obscure fanatic's bullet—as at Sarajevo . . .' had to do with it.

Again, on page 158, one reads, '. . . we shall explain the ideas underlying the

mathematical apparatus used by Einstein in formulating his Relativity Theory'. What follows recalls to my mind the sixth-form skill I acquired in manipulating determinants but helps me not one little bit in understanding Einstein. Perhaps my failure to understand is because I am a non-mathematician, but frankly, this explanation is too generous to the author. He fails in the task he sets himself.

How complete is this failure? It would be presumptuous of me to give a direct answer, but I should like to indicate what I expected to find in the book. It must be axiomatic that the standard of 'comfort' in this world (I eschew carefully the word 'living') is dependent on the extent to which Man harnesses Power and applies it as a substitute for his own efforts. Electricity is probably contributing more than all other manifestations of Power to our everyday wants—certainly so in the Western Hemisphere—and why is this so? Because Electricity as a phenomenon aroused the curiosity of the mathematician, the physicist and the engineer. What a wonderful topic to demonstrate how mathetmatical concepts enter vitally into the common activities of modern civilized life, but the author neglects it. Whether the $\sqrt{-1}$ is irrational or imaginary, how good would it have been to read how it intrudes into all calculations dealing with alternating electric currents. The author could even have devoted a whole chapter to that delightful expression

$$e^{\pi i} + 1 = 0$$

where $i \sqrt{-1}$
which spells mathematical poetry to me.

J. E. P. DUNNING

PRINCIPLES OF BRITISH AGRICULTURAL POLICY. *A Study sponsored by the Nuffield Foundation. Edited by H. T. Williams. London, Oxford University Press (for the Nuffield Foundation)*, 1960. 18*s net*

It would be an onerous task to compile a bibliography of all the books that have been written on agricultural policy in the past half century. Many were written before, some sanguine, some pessimistic. They range from the amateur productions of enthusiasts to the work of highly trained professionals; from the government commission or committee to the agricultural economist and historian whose labours are pursued in the peaceful environment of our universities and schools. And now we have a study, sponsored by the Nuffield Foundation and commenced under the auspices of a distinguished committee, that professes to lay down the principles that should guide future policy. The committee, however, three of whose eight members were eminent officers of the National Farmers Union, disclaims any responsibility for the report in its final form.

The problems involved in such an enterprise are many, varied and difficult. The report deals with them all, in the main by an examination of the course of agricultural progress or retrogression during the past century, and more particularly since the First World War, together with the effects of government inaction or action in the same time. Consequently a great deal is said that cannot but be familiar to all interested parties: but all must nevertheless be grateful for what is no less than an encyclopædic review of our farming in its national and international setting as it has been and is now.

The conclusions arrived at are in some respects a little surprising. Substantially they are a confirmation of government policy during and since the war. Elsewhere it is rare to find anything but criticism of government policy. Of course, policy had to have the backing of the farmers, who were the people who carried it out. The results have been so excellent that our national farming is now more productive and better equipped than ever before.

This desirable result has been achieved by a technique called indifferently balanced farming or mixed farming and, provided government support is still provided, the

future, says the report, should follow the same lines. Mixed farming is generally thought of as the system worked out some 200 years ago when clover and roots were first introduced. It changed the earlier 3-course to a 4-course rotation, with provision for maintaining more and better livestock, the animals being kept not only to produce meat, milk, etc., but quantities of animal manure. Some emphasis, too, is laid upon weed eradication and other recognized advantages of change of crop. The report naturally discusses the many developments that have since taken place; among others the introduction of chemical fertilizers, weed and pest control sprays, powerful modern machines, new crops like sugar beet. Population increases, exploration and exploitation of new countries, modern communications, etc., have also entirely changed the international economic situation. With these things in mind some writers have questioned whether the continuance of mixed farming is likely to be advantageous in the future as in the past. The report comes down very heavily in support of it, making some play with the value of the animal manure produced, which must be very variable in chemical composition, with the consumption of crop residues, and other familiar arguments. In itself it is profoundly convincing, but it should be read with the criticisms of this technique made by C. S. Orwin and other well-informed writers.

The book is in five sections, comprising 'principles' derived from history, agricultural science and farming experience, a review of farming life, strategic considerations, and demand and supply of farm products. The historical review does not include any reference to the recent work of T. W. Fletcher on the Great Depression, which suggests that it was somewhat exaggerated in the Richmond Commission's evidence and report. Otherwise it tells the familiar story of the First World War, the bad years, the Second World War and the strong position of farming in our economy to-day. On page 14 the extraordinary statement is made that 'in 1937 the price per pound [of tea] had been raised to 15*s*. 2*d*. as compared with 11*s*. 7*d*. in 1933'. I certainly did not pay that price.

It is very pleasing to learn that the advantages and disadvantages of life in the country are not of the kind that can be measured, and that the gains and losses of country life viewed against town life roughly cancel out. Many town amenities are indeed now readily available to the countryman.

This book is a compendium of past policy and development, and deserves careful study by all awake to the problems of food production that are immediate and of the first future importance, despite the flavour of orthodoxy in its conclusions.

G. E. FUSSELL

SHORT NOTES ON OTHER BOOKS

BLACKIE & SON, 1809–1959. *A Short History of the Firm. By Agnes C. Blackie. London, Blackie* [1959].

A stylishly produced account of the origins and development of this well-known family of publishers, which recently celebrated the 150th anniversary of its formation.

METALWORK AND ENAMELLING. *A Practical Treatise on Gold and Silversmiths' Work and their Allied Crafts. By Herbert Maryon. London, Chapman & Hall*, 1959. 45*s net*

The fourth edition, revised, of a work which, in the half century since it was first published, has established itself as the standard textbook of practical instruction for those employed in the gold and silversmiths' trades. The present edition includes over 300 of the original drawings, and also twenty-nine new plates illustrating fine examples of the craftsmanship of the past.

EVERYDAY LIFE IN ROMAN AND ANGLO-SAXON TIMES. *By Marjorie and C. H. B. Quennell. London, Batsford,* 1959. 18*s net*

This volume incorporates in revised form two books in the series hitherto published separately—*Everyday Life in Roman Britain* and *Everyday Life in Anglo-Saxon, Viking and Norman Times*. The text has been brought into line with the results of recent archæological research, and the illustrations have also been improved.

FROM THE JOURNAL OF 1860

VOLUME VIII. *6th July*

DOMESTIC ECONOMY, RECREATION, AND EARLY CLOSING

[*The ninth annual conference of representatives from Institutions in Union and the Local Education Boards with the Council of the Society was held on 22nd June,* 1860, *when the following were among the subjects discussed. All three resolutions were carried unanimously.*]

IV. *Would it be well to make special arrangements for women in the examinations: or are the arrangements of the present programme suitable or sufficient for them?*

Mr. Blake said this was a very important subject, and while he considered it desirable and necessary that women should be instructed in the elementary branches of reading and writing, yet there were pursuits of more consequence to women in humble life, whether as domestic servants or wives of working men. This subject had been taken up by the associated Institutions of Lancashire, and they had undertaken an examination of women in the various branches of domestic economy. He had brought with him one of the examination papers used at Leeds, which showed the points to which the examinations were directed, embracing household duties, cooking, and the prices of provisions. The skill of the candidates in cooking was tested in the preparation of a dinner given to the poor at a festive season. The ignorance of thousands of factory girls and women upon the commonest matters of domestic economy and management was truly deplorable, and he had heard of an instance of a woman cutting out a shirt for her husband by fitting the cloth to his shape as he lay upon the floor. . . . The resolution he begged to move was as follows :

> That, in the opinion of this meeting, it would be desirable, whenever practicable, to institute Examinations for women in the most important branches of domestic economy.

Mr. Chester said this subject had been under the consideration of the Council, but they had not yet come to a decision upon it; and if they determined upon holding an examination in that subject, the Dean of Hereford would be the examiner. . . .

IX. *Without losing sight of the Educational Character which it is desirable that Institutions should always maintain, how far can they judiciously promote such out-door and in-door recreation as may be beneficial to the physical and mental health of the members?*

Mr. Blake moved the following resolution:

> That in the opinion of this Conference, the promotion of healthful and innocent recreation, whenever practicable, is highly desirable, as conducive to physical and mental vigour, and the retention of Members of Institutes during the summer months.

Rev. Robert Maguire (Tottenham and Clerkenwell Working Men's Institute)

said the great question was how were they to recreate the working men of the metropolis and large towns which were situated several miles from the green fields. Rowing clubs were out of the question, and cricket could only occasionally be engaged in. He . . . was not one of those who set their faces against harmless recreation. The social character of the people was next in importance to their religious character, and in proportion as they discouraged innocent and healthful recreation for the people, they inflicted an injury upon society at large. He had never thought it unbecoming his profession to take up the bat and ball with the members of the Institution over which he presided, and in the same spirit he had encouraged rifle practice. . . . He was glad this subject had been brought before this Society, and he should rejoice if it planted the impress of its name upon this work. . . .

X. *Shall the Conference express its opinion in favour of Early-closing and Holidays, with reference to the moral, intellectual, and physical health of the members of the Institutions?*

Mr. Blake moved the following resolution:

> That, in the opinion of this Conference, it is desirable to promote the early-closing of business establishments and occasional holidays, in order to increase the opportunities for mental improvement and physical recreation.

He said he thought that an expression of the opinion of this Conference might tend to remove some of the objections which were still entertained by the employers of labour to early-closing. As one objection, it had been argued that the young men thus liberated from business would spend the time in an improper manner; but it was a poor argument that, because in some individual cases the privilege had been abused, the whole class of assistants were to be immured in the shops until a late hour at night.

Rev. J. A. Hatchard would have preferred that any recommendation emanating from this Conference on this matter, should have included the Saturday half-holiday which he thought it was an important thing to accomplish, as generally as possible, throughout the country, in connection with the moral, intellectual, and physical health of the working classes. In Edinburgh and Glasgow it was difficult to get any kind of business attended to on Saturday afternoons, and as showing how extremes sometimes met, it was a curious fact that in ultra-Protestant and ultra-Roman Catholic counties, the boom of relaxation from labour in the after-part of Saturday was alike granted. It was most important that this venerable Society should give its aid in providing more holidays for the people than they at present enjoyed.

Mr. Blake remarked that gentlemen in London must not go away with the notion that the workpeople in the country had no holidays. . . . Whilst in London Monday was more or less a holiday, in the manufacturing districts Easter and Whitsuntide were real holidays, without the masters being consulted at all in the matter, when the cotton spinners turned out by tens of thousands, and joined heartily in the excursions offered to them.

Mr. Valentine Knight remarked that this proposition was easy in theory, but he was afraid it would be found difficult in practice; for, whilst on the part of the workman it was said 'a fair day's wage for a fair day's work', the reply on the part of the employers would be, 'a fair day's work for a fair day's wage'.